ECCO
Eighteenth Century Collections Online Print Editions

Medicine, Science and Technology

The art of making masts, yards, gaffs, booms, blocks, and oars, as practised in the Royal Navy, and according to the most approved methods in the merchant-service. Including a description of an improved rule for mast-makers

David Steel

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Steel, David
ESTCID: N016276
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iv,174,[2]p.,plates ; 8°

ECCO

Eighteenth Century
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METHOD of FIXING the MASTS in the ROYAL

The large figure is a Ship, whose Masts are to be got on bo
The small Ship shews the mode of fixing the Sheers in a

ard, lying along the Sheer Hulk, as practised in the Navy.—
Merchant Ship, and getting her Masts on board.—

THE

ART OF MAKING

MASTS, YARDS,

GAFFS, BOOMS, BLOCKS, AND OARS,

AS PRACTISED IN THE

ROYAL NAVY,

AND ACCORDING TO THE MOST APPROVED METHODS IN THE

MERCHANT-SERVICE.

INCLUDING A

DESCRIPTION OF AN IMPROVED RULE FOR MAST-MAKERS:

ALSO

A NEW METHOD BY WHICH LARGE YARDS MAY BE MADE FROM SMALL TREES, AND REPAIRED WHEN SPRUNG IN THE SLINGS, &c.

ILLUSTRATED WITH LARGE ENGRAVINGS AND NUMEROUS FIGURES.

LONDON

PRINTED FOR DAVID STEEL, AT HIS NAVIGATION-WAREHOUSE,

NO. I, UNION-ROW, LITTLE TOWER-HILL.

M.DCC.XCVII.

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ERRATA.

Page.	Line.	
3	10 and 11.	For *a ſquare part left at the back of the eye that they may not be driven on the eye, and ſo endanger ſplitting*, read *a ſquare part left under the eye that they may not bend*
5,	10,	For CLEATING read CLINCHING.
40,	7,	For *ſtops* read *ſpots*.
46,	12,	For *at* read *as*.
83,	4,	After MAIN-YARD inſert 100 *to* 74 *guns, ſeven-eighths, others eight-ninths, &c.*
98,	in the table,	For *driver-booms* read *jib and driver booms*
98,	9,	from the bottom, For 4 *inches* read 5.
98,	3, 5, and 7,	from the bottom, For 3½ read 4½.
136,	3,	from the bottom, For 10 read 40.

EXPLANATION OF TERMS

AND

DESCRIPTION OF THE TOOLS

USED IN

MAST-MAKING,

ALPHABETICALLY ARRANGED.

ADZE. A ſharp tool, uſed after an axe or ſaw, for the purpoſe of trimming ſurfaces ſmooth

AFT. The hinder part of the ſhip, or that neareſt the ſtern.

ARM Each end of a BIBB, or BRACKET, which ſee hereafter.

AUGER An inſtrument to bore holes with.

AXE. A ſharp tool to trim off rough wood, and to prepare ſurfaces for being ſmoothed with the ADZE.

AXIS. A real or ſuppoſed line through the centre of a body, about which it may turn.

BATTENS. Thin pieces of oak or fir, nailed on to maſt-heads and the midſhip-part of yards.

BAULKS. Short fir timber.

BEARDING is diminiſhing any piece from a given line on its ſurface to make the thickneſs leſs on the edge.

BED. The place of the greateſt diameter in bowſprits: alſo, the main piece of barrel-ſcrews, through which the puppets work; for which ſee SCREWS.

BEES. Pieces of elm plank bolted to the outer end of bow-ſprits.

BEVELLINGS are angles that differ from right angles, called, by workmen, either under or ſtanding bevelling. By the former is meant an acute, and by the latter an obtuſe, angle. Bevellings are taken by an inſtrument called a BEVEL, which reſembles a SQUARE, only the tongue is moveable, and fixes to the angle required. To tranſfer it, or ſet it off on the piece, is the ſame operation as by the SQUARE.

BIBBS, or BRACKETS, are made of elm plank, and bolted to the hounds of maſts, as ſupporters to the treſtle-trees.

BLOCK. An eight-ſquare or round part below the heeling of main and fore topmaſts.

BLOCKS. Short pieces, laid under a maſt, to raiſe it from the ground

BOARD. Timber ſawed to a leſs thickneſs than plank, as one inch and under.

BOLSTER. A ſort of pillow made of fir, faſtened on each ſide of the maſt-head, to prevent the ſhrouds from chafing againſt the treſtle-trees.

BOLTS.

BOLTS. Cylindrical pins of iron. The COMMON BOLTS have ſmall round heads, and are uſed to unite two or more pieces together. The SAUCER-HEADED BOLT has a round flat head, with a mortiſe or a point at the other end; and is uſed to faſten moveable pieces to fixed ones. The EYE-BOLT has an eye at one end, for laſhing or hooking blocks to, &c. and are driven into maſt-heads, yards, caps, &c. The SHOULDER-BOLT is a ſpecies of eye-bolt, having a ſquare part left at the back of the eye, that they may not be driven on the eye, and ſo endanger ſplitting. The SPRIG-BOLT is a ſmall eye-bolt, ragged towards the point. The P BOLT is an iron pin with an eye formed on the head, the pin-part of the bolt is continued up rather above the top of the eye, to prevent the eye from being ſplit in driving: it is uſed on the under ſides of caps, to hook the top-tackles to. The TOGGLE-BOLT is an iron pin with a flat head, having a ſquare hole punched through, to admit a toggle. it is uſed for the ſtrap that ſecures the jack-ſtaff to the bowſprit-cap.

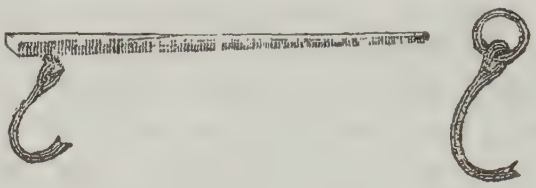
BOOM-IRONS are rings faſtened to the quarters and extremities of yards, for the ſtuddingſail-booms to ſlide through.

BUTT. The lower part next the root of a tree, alſo the lower ends of any part of made-maſts, and the ends of coaks, tablings, haunches, &c.

CALLIPERS are compaſſes with circular legs.

CANT-HOOK is a ſemicircular hook, or iron ring, connected by a ſmall eye-bolt to the end of a lever or handſpec. Sometimes the hook has a ſmall ring ſhut in one end, through which the end of a handſpec is occaſionally thurſt. A large piece of timber can, by this, be canted, or turned over, by one or two

men, thus; the hook is placed to graſp the timber, ſo that the weight of the men, applied at the other end of the lever, brings it down and turns it over.



CANTING. A term denoting the act of turning any thing over from its former poſition.

CANT-PIECES are uſed in the angles of the fiſhes and ſide-trees, or to ſupply any part that may prove ſappy or rotten.

CAP. A thick block of elm timber, with two holes perpendicularly to its length and breadth, and parallel to its thickneſs, (the foremoſt hole being round and the after one ſquare,) uſed to confine two maſts together, when one is erected at the head of the other to lengthen it.

CARLINGS. Pieces of oak timber, about eight feet long and eight inches ſquare, or more, uſed for framing the partners.

CHAMFERING. Taking off angles or edges.

CHEEKS are projecting parts on each ſide of the maſt, to ſuſtain the frame of the top and topmaſt.

CHEEKS, head of the, that part above the ſtops.

CHISSELS. Well-known inſtruments uſed by carpenters, &c. for cutting or preparing of wood

CHOCKS. Pieces made to faſhion out ſome part wanting, or to place between the head of a lower maſt and heel of a topmaſt.

CLEATS. Pieces of plank or board of various ſhapes, for different purpoſes, and are nailed wherever wanted, with more or leſs nails, according to the ſtrain they are to reſiſt. Thoſe uſed for ſtopping of ſhores are moſtly made of elm, ſimilar to wedges, but taper only from one ſide: thoſe for ſtopping of rigging are haunched on the

back

back with a hollow, from one-third of the length, the thin end is ſhaped with a duck's bill, they are made of oak, but, for maſt-heads, of elm. COMB-CLEATS are ſtrait on the inner edge, and round on the back, with a hollow cavity in the middle. SLING-CLEATS of lower yards, are made with one arm, belaying-cleats with two, one on each ſide the middle. THUMB-CLEATS are ſimilar to ſling-cleats, but ſmaller, to hang any thing thereon.

CLEATING. Making faſt the point of a bolt or nail on a ring or rove of iron, by battering the point and making it ſpread.

COAKS are oblong ridges left on the ſurface of different pieces of made-maſts by cutting away the wood round them, the intermediate part is called the PLAIN.

COAKING is uniting two or more pieces together, in the middle, by ſmall tabular pieces, formed from the ſolid of one piece and ſunk exactly the ſame in the other, the butts, or ends, of which prevent the pieces drawing aſunder lengthways.

There are different methods of coaking, as follow: COAK-AND-PLAIN is when a coak is formed, and a plain ſurface follows between that and the next. RUNNING-COAKS are coaks continued the whole length along the middle, but anſwer the above purpoſe, as the butts of each coak come one-third their breadth within and without each other alternately. CHAIN-COAKS are formed one at the end of the other on the oppoſite ſides of the middle line. See TABLING.

CROSS-TREES. Pieces of oak timber athwart the upper ends of the lower maſts, let in and bolted to the treſtle-trees.

DEALS are of ſimilar thickneſs to plank, but the term is confined to fir.

DOULING. A method of coaking, by letting pieces into the ſolid, or uniting two pieces together with tenons.

DRAWING-KNIFE. A long narrow edge-tool, with a handle in each end.

DRIFT means the difference between the ſize of a bolt and the hole into which it is to be driven, as, if a bolt be 1-8th of an inch

inch larger than the hole, the bolt is ſaid to have 1-8th drift. And ſo of a hoop which is to be driven on a maſt.

DUBBING. Reducing or taking wood away with an adze.

ELM. Wood of ſingular uſe when continually expoſed either to wet or dry; its grain being tough and curly makes it not liable to ſplit. If felled between November and February it has no ſap. It is uſed in maſt-making for caps, bibbs, bees, and part of tops.

FACING. Letting one piece into another with a rabbet.

FAYING. The joining of one piece to another, that the leaſt opening may not appear; it is performed by moulds, bevellings, or by laying one piece on the other, and ſetting them as cloſe together as poſſible, then with compaſſes take the diſtance they may be aſunder, and let that diſtance, or ſpoiling, be ſet off from the ſurface or edge of the ſtraiteſt or faireſt edge on to the ſides of the other, at as many places as may be neceſſary for lining. If the pieces coak or table together, the thickneſs of the coaks or tablings muſt be added to the former gage or ſpoiling.

FERRULE. A ſmall iron hoop, fixed on the extremities of the yards, booms, &c.

FILLINGS. Pieces uſed to make a fair curve for the wooldings, between the edges of the fiont-fiſh and ſides of the maſt.

FID. A ſquare bar of iron or wood, uſed to ſupport the weight of the topmaſt, &c. when erected at the head of the ſtanding-maſt.

FIR, in maſt-making, is the moſt uſeful wood for length, ſize, and lightneſs. It forms the body of the maſt, the ſpindle, ſide-trees, fiſhes, cheeks, fillings, and cant-pieces. Maſts are alſo frequently made of ſingle trees, as are yards, booms, topmaſts, &c.

Fir-trees of Riga and Gottenburgh exceed in ſtrength about one-tenth thoſe of Norway, and one-ſixth thoſe of New England: and fir-trees of Scotland exceed in ſtrength thoſe of Norway.

Though the Riga and Gottenburgh trees exceed thoſe of New England in ſtrength, the latter have the advantage in ſize, as a large maſt may be made of a ſingle tree: but maſts made of Gottenburgh,

tenburgh, Riga, or Norway, trees, are compoſed of the moſt ſubſtantial parts of ſeveral.

FISHES. SIDE FISHES. two long pieces of fir, coaked on the oppoſite ſides of a made-maſt to give it the diameter required. FRONT FISH or PAUNCH. A long piece of fir, hollowed on the ſide to the convexity of the maſt, and rounded on the back. It faſtens to the fore-ſide of lower maſts in the middle, adding ſecurity and ſtrength. Fiſhes are alſo uſed in the middle of maſts, yards, bowſprits, &c. ſprung or damaged at ſea.

FLAG-STAFFS are light poles, formed by, or erected on, maſt-heads; alſo at the heads and ſterns, on which flags are hoiſted.

FLOORS. The loweſt timbers in a ſhip.

FORE-AND-AFT. From ſtem to ſtern, or in that direction.

FORELOCKS. Small wedges of iron, pointed at the end, to drive through mortiſes in the ends of bolts, to retain their fixed poſition, and prevent their drawing.

FORELOCKS, SPRING, have heads, and are ſhouldered underneath, to prevent their going through the mortiſes; they alſo have thin tongues at the points, as ſprings, to keep them from coming out: theſe are uſed to bolts that often require ſhifting.

FORWARD. The foremoſt part of the ſhip, or that neareſt the head.

GAGE. A meaſurement taken by a rule or compaſſes, or any given ſize of work is called its gage.

GAMMONING. A rope that binds the inner quarter of the bowſprit cloſe down upon the ſtem.

GIRTH. The circumference.

GUNWALE. A board of elm, nailed to the upper ſides of the timbers, at the aft-part of a top. The upper flat planks on the ſide of a veſſel are likewiſe called the gunwale.

HAUNCH. A ſudden decreaſe in ſize.

HEAD OF THE MAST is the upper part of the maſt from the ſtop of the cheeks.

HEEL.

HEEL. The lower end of a maſt: the ſame as butt.

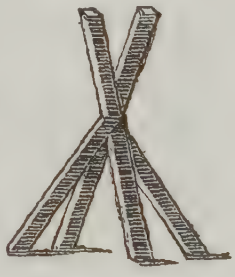
HEELING. The ſquare part left at the lower end of a top-maſt and topgallant-maſt.

HEWING. Trimming off the rough from timber, &c. with an axe.

HOOK-BUTT is the ſurface raiſed acroſs higher in one place than another.

HOOPS are ſtrong circles of iron driven on maſts and yards. CLASP-HOOPS have a hinge in the middle, and faſten together with forelocks through mortiſes made in the ends. MOULD-HOOPS are thoſe that deviate from a circle; and which are made from moulds previouſly prepared.

HORSE is a wooden frame, uſed to ſupport light work that wants rounding, &c. ſo that a man may ſtand eaſily to perform it. It conſiſts of two ſides, about four inches broad, two inches and a half thick, and four feet ſix inches long, ſcored or lapped together about the middle, like a croſs, with two long legs and two ſhort arms; theſe are farther ſupported by two legs, at right angles with theſe two ſides, their upper ends being ſhaped and nailed thereto.



HOUNDS. The place next under the head of a maſt, where it is made more ſubſtantial for ſupporting the treſtle-trees and top.

JAWS, or HORNS, to the inner ends of gaffs and booms, are ſemi-circular, to confine them to the maſt by embracing half its circumference.

JURY-MASTS. Maſts uſed inſtead of the proper ones, in caſes of neceſſity or otherwiſe.

KEEL. The loweſt part of a ſhip, formed by ſquare timbers ſcarfed together endways.

KEELSON. Square pieces of timber fayed to the upper part of the floors over the keel.

LAP. To cover one piece with part of another.

LARBOARD-SIDE. When looking forward from the ſtern, is the left ſide.

LEATHERING. Prepared leather, dreſſed cloſe round the circular holes of caps, and the ſweep of jaws belonging to booms and gaffs, nailed on the upper and under ſides.

LINING is marking the length, breadth, or depth, of any thing, according to deſign, by a cord, rubbed with white or red chalk, faſtened at the extremities, and forcibly pulled up in the middle, or towards one end, then let fall perpendicularly, if meant to be ſtrait, or thrown ſideways to form a curve. To perform the latter with exactneſs requires practice.

MALL. An iron tool to drive bolts with, &c.

MALLET. A wooden tool, to drive with.

MAST-COAT conſiſts of ſeveral breadths of tarred canvas, ſo ſhaped as to fit round the maſt at the partners, to prevent water getting down between it and the deck.

MIDSHIPS, when ſpeaking with regard to the breadth of the veſſel, is a ſuppoſed line from the ſtem to the ſtern-poſt; but, with regard to the length of the veſſel, the broadeſt part is called the midſhips, although that is not the middle of its length.

MOULDS are made of board to the ſhape of ſome deſign; or to the ſhape of ſuch pieces as are wanted for making good deficiencies, others, for making of hoops, are made to the ſhape and ſize of the maſt, and nailed together at the corners.

MOULDED. Signifies breadth in oppoſition to "SIDED," which denominates thickneſs; or the ſides of a piece ſhaped by a mould.

NAILS, DUMP, are round, and have long flat points.

NECK. The arms that ſupport the boom-ring are called the neck of the outer boom-iron.

NUTS. Small ſquare pieces of iron, with a ſcrew-hole cut in the middle.

OAK. The moſt uſeful timber for ſtrength and durability, when expoſed to the weather. It is uſed, in maſt-making, for treſtle-trees, croſs-trees, and open tops.

OUT-OF-WINDING. *See* WINDING

OVOLO. A moulding conſiſting of a round and hollow.

PARTNERS. The place where the deck interſects the maſt, which is there made more ſubſtantial for wedging the ſame. But, in maſt-making, it more generally implies the place of the middle-deck, in three-deck ſhips, and the place of the upper-deck, in two-deck ſhips; and at that place the given diameter in the Table of Dimenſions is applied. All maſts are to keep the ſame ſize as the given diameter at each deck.

PIECES, HEEL, HEAD, or HOUND, are ſhort pieces to make good ſome deficiency.

PLAIN. An even ſurface between the coaks.

PLANE. A well-known tool to make ſmooth with.

PLANK. Broad timber, from four inches to one inch thick.

PLUMB. Perpendicular.

PLUMB-LINE. A line ſuſpending a lump of lead, which keeps it ſtrait and perpendicular; by it is taken, at the ſide of maſts, &c. the diametrical dimenſions, to correſpond with the line or lines ſtruck on the ſurface of the upper ſide, to which it is ſawed.

POKER, for driving hoops on maſts, is about 8 feet long, $1\frac{1}{8}$ inch in diameter, with a flat foot at one end, and round knob at the other.

PUPPETS. Two upright pieces, with a ſcrew cut in the lower ends: they are parts of the barrel-ſcrews. See SCREWS.

QUARTERS. A term given to ſome of the diviſions on a maſt, yard, &c. where the different diameters are ſet off, for lining or marking.

RABBET. A ſmall ſquare channel cut in the edge of one piece to let in another of equal ſize.

RACE. To mark, by the edges of moulds, with a racing-knife or points of compaſſes, upon timber, &c.

RACING-KNIFE. A ſmall tool to race with.

RAILS are made of wood or iron, and fitted acroſs the aft-ſide of tops, to prevent the men from falling.

RAKE. The inclination of the maſts from a perpendicular with the keel.

RAM-LINE. A long line, (thicker than common,) uſed to gain a ſtrait middle-line upon a tree or maſt. It is made faſt at one end, and hauled upon at the other till it is quite ſtrait, and then made faſt.

RECONCILING is the making one fair ſurface of two pieces. Thus the workman is often directed to leave a certain ſubſtance for RECONCILING.

RIM. A ſkirting of narrow elm-board round the upper ſide of tops.

RIND-GALL. The damage which a tree receives when young, ſo that the bark or rind grows in the inner ſubſtance of the tree.

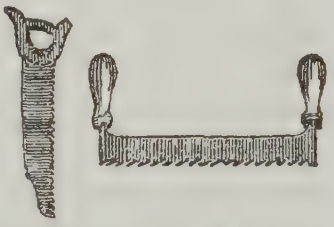
RING. A ſmall circle of iron, uſed to put over the point of a bolt, between the wood and the forelock, to prevent its chafing or cutting the wood.

ROUNDING. In large maſts, the ſixteen-ſquare is divided into four parts, and lined, and thoſe angles dubbed off. Smaller maſts, yards, &c. have the angles of the ſixteen-ſquare taken off with a drawing-knife, and then are rounded fair and ſmooth with planes.

ROVE. A ſmall ſquare piece of iron, with a hole in the middle, whereon is clenched the point of a nail, to prevent its drawing.

SADDLES. Semi-circular pieces of wood, ſhaped and faſtened to the upper ſide of the bowſprit.

SAWS. Of theſe tools, two are principally uſed by maſt-makers; the common HAND-SAW and the CROSS-CUT-SAW.

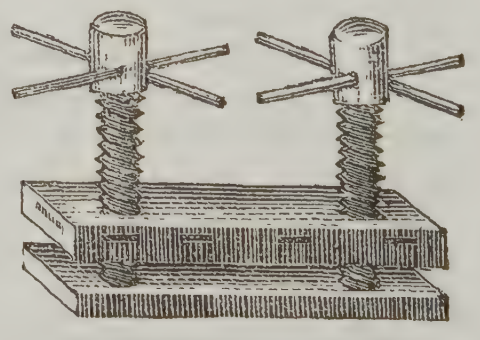


SCANTLING. The thickneſs or depth of a piece of timber

SCARFED. The end of one piece of timber lapped over or let into another, to appear a ſolid and even ſurface.

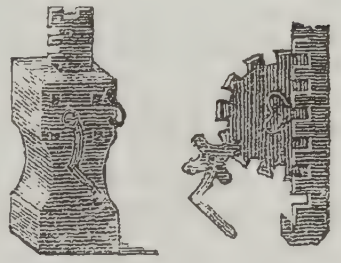
SCORE. A notch cut out of any piece of wood, to admit another projecting in a ſimilar ſhape.

SCREWS, BED or BARREL, for raiſing the heads of large maſts and fixing the treſtle-trees, are made of elm, and conſiſt of two puppets, a bed, and a ſole. the puppets are four feet nine inches long, have their lower parts round like a cylinder, and are cut with a ſcrew, their upper part, or head, is larger, and is either eight-ſquare or round, with iron hoops driven on, to prevent their ſplitting: through theſe heads are holes, on the different ſides, through which long iron pins are thurſt, which put them in motion by preſſing againſt them, and acting as levers. The bed is a broad thick piece of elm, three times the diameter of the ſcrew in breadth, once the diameter of the ſcrew in thickneſs, and about ſix feet in length, with a hole at each end of the bed, for the ſcrews or puppets to work in. Six bolts are driven through the bed, and clenched on a ring to prevent its ſplitting; two are in the middle, and two at each end. In the ſides and ends, mortiſes are cut for hand-holes. The ſole is the ſame breadth and length as the bed, and half the thickneſs, with a hole hollowed out at each end for the puppets to work in. Sometimes the ſole is thicker, and, inſtead of holes, has an iron plate, with a hole let into each end, wherein works an iron ſprig, that is driven into the heel of the puppet with a ſhoulder.



SCREWS,

SCREWS, HAND. A box of elm containing cogged iron wheels, of increaſing powers. The outer one, which moves the reſt, is put in motion by a winch on the outſide, and is called either ſingle or double, according to its increaſing force It is ſometimes falſely called a JACK The outer figure here ſhewn repreſents the inſide work ſeparately.



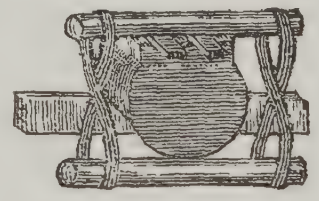
SCUTTLE. A ſquare hole cut through a floor, and furniſhed with a lid or covering.

SEAMS. The openings (in which oakum is driven) between the pieces that compoſe made-maſts, yards, &c.

SET-OFF. A term uſed for marking down the diſtance of any dimenſion or ſpoiling from a given place.

SETTS. Powers made uſe of, where force is required, to bring or unite two or more pieces together. It is performed by ſcrews, ſhores, croſs-ſetts, or cleats.

SETTS, CROSS, are made by two ſhort pieces of ſpar, about four or ſix feet in length, one is laid acroſs on the upper ſide, and the other on the under ſide, of any two pieces that are to be brought together, and their ends laſhed together on each ſide with ſeveral turns of rope, taken round each end alternately, wedges are then driven in between the upper croſs-pieces, and the ſide or part of the maſt.



SHAKY is expreſſed of a piece of timber that is unſound.

SHEAVES. Solid cylindrical wheels, fixed in mortiſes, cut in the maſts, yards, booms, caps, or blocks, and moveable about a pin or bolt as an axis.

SHEER-HULK, which is uſed in the royal navy for maſting of veſſels, is an old ſhip of war, cut down to the gun or lower deck, with a maſt fixed in midſhips, about 33 inches diameter, and 108 feet high, ſtrengthened with ſhores, the upper ſhore 87 and the lower ſhore 81 feet long, and each 19 inches diameter.

There

There are ſhrouds and ſtays to ſecure the maſt and ſheers, which act as the arm of a crane, ſupported by a derrick, 100 feet long and 22 inches diameter, to hoiſt in or out the lower maſts, when conveniently laid along-ſide.

There are three ſheers, each compoſed of two pieces, 22 inches diameter, ſcarfed together in the middle, to make 116 feet in heighth. The heels reſt upon the ſides of the hulk, and the heads incline outward from a perpendicular, to hang over the veſſel whoſe maſts are to be fixed or diſplaced. This is performed by large tackles, extending from the head of the maſt to the head of the ſheers. The tackles are uſed by means of two capſtans fixed on the deck.

SHEERS, uſed for maſting veſſels in the merchant-ſervice, are two hand-maſts or large ſpars, erected on the veſſel whoſe maſts are to be fixed or diſplaced, the lower ends or heels reſt, on oppoſite ſides of the deck, upon thick planks ſufficiently long to extend over two or three beams ſhored underneath. The two hand-maſts croſs each other at the upper end, and are ſecurely laſhed. A tackle is laſhed in the centre, and hangs perpendicularly over the ſtation where the maſt is to be fixed.

The ſheers are ſecured by guys, or ſtays, of proportionable rope, extending fore and aft to the oppoſite extremities of the veſſel. See the frontiſpiece to this work.

SHORES are made of ſmall ſpars, cut to ſuitable lengths, that their heels may reſt againſt a cleat, nailed on the maſt or floor, or againſt a ſtump driven in the ground, or any thing of greater reſiſtance than the force required. The ſett is made by driving wedges between the head or heel of the ſhore.

SIDED is applied to that ſide of any piece of timber which is not ſhaped by a mould.

SIDE-TREES. The lower main pieces of a made-maſt.

SLABS are the pieces which are ſawed from the ſides of rough trees, when lined out for maſts, &c.

SLIDING-RULE. A flat uſeful inſtrument, one foot long, with a ſlide, on which various dimenſions and proportions are marked; a particular deſcription of which, and of its uſes, will be found hereafter.

SLINGS.

SLINGS. The middle of a yard, or that part which is attached to the maſt.

SNAPING. Reducing the ends of any piece to a leſs ſubſtance.

SPARS. Small fir-trees.

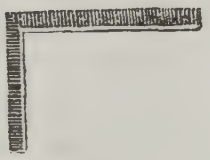
SPOILING is taking the greateſt diſtance of the inequalities between any two pieces to be fayed together.

SPINDLE. The upper main piece of a made-maſt.

SPRIG-BOLT. See BOLTS.

To SPRING. A maſt or yard is ſaid TO SPRING, or to be SPRUNG, when, by any violence of the wind or motion of the ſhip, it is cracked or ſplit in any part.

SQUARE. An iron or wooden inſtrument, with a perpendicular and baſe, uſed as a guide to ſet-off by.



SQUARING is making one or more ſides from the plumbed ſides, which may be performed by a plumb or ſquare, the tongue of which is a perpendicular to its ſtock or baſe.

An eight-ſquare is formed by reducing a four-ſquare nearer to a round, by taking off the angles, which are lined or marked within the edge, or from the middle line on each ſide.

A ſixteen-ſquare is made by reducing a maſt, or any other piece, nearer to a round, by taking the angles off the eight-ſquare.

STAFFS. Short pieces by which the ſetts are made, alſo long narrow pieces, with diviſions of ten or twenty feet marked thereon, and again divided into halves. They are uſed to ſet-off great lengths.

STANTIONS. Small pillars of wood to ſupport the top-rail.

STARBOARD-SIDE, when looking forward from the ſtern, is the right-ſide.

STEP. Large ſolid pieces of oak timber, fixed acroſs the keelſon, into which the heels of the maſts are fixed by the tenon.

STERN is the after or hindermoſt part of a veſſel above the ſtern-poſt.

STIVING. A term uſed for elevating any thing ſo as to make an angle with the horizon.

STOPS.

STOPS. Square projections or ſhoulders, left on the outſides of the cheeks, at the upper part of the hounds of lower maſts; alſo on topmaſts and topgallant-maſts, and at the outer end of jib-booms.

To STRIKE. To draw a line or delineate a circle.

TABLING is the uniting of pieces together in a manner ſimilar to the chain-coak, but broader, coming quite or very near to the edge, from the line in the middle.

TAR. A liquid gum, diſtilled from pines or other fir-trees, and prepared for uſe by boiling, &c.

TACKLE. A machine formed by two blocks connected by a rope.

TEAK. A hard and durable Aſiatic wood, uſed abroad for maſts and hound-pieces for topmaſts.

TENON. The end of a maſt, bowſprit, &c. cut ſmaller to fit into a mortiſe.

'THWARTSHIPS. Acroſs the ſhip at right-angles with the keel's length.

TIMBERS. A name given to thoſe croſs-pieces to which the platforms of cloſe tops are faſtened.

TOGGLE. A ſmall wooden pin.

TONGUE. The tapered part at the lower end of the ſpindle, or of a ſcarf.

TOP. A platform projecting round the lower maſt-head. its principal uſe is to extend the topmaſt-ſhrouds by a greater angle, and give additional ſupport. In the ſides of the top are ſquare mortiſe-holes for the futtock-plates to go through, with dead-eyes bound in their upper parts, to unite the topmaſt-ſhrouds with thoſe of the lower maſt.

The top is extremely convenient for extending and managing the ſmall ſails, and fixing or repairing the rigging.

Tops of ſhips of war are, for defence againſt ſwivels, muſquetry, &c. barricadoed, with a thick fence of corded hammocks, from the foremoſt topmaſt-ſhroud round aft along the rail, breaſt-high. The rail is ſupported by ſtantions let into the top, with a netting from ſide to ſide, the outſide is covered with baize

baize or canvas, and furniſhed with ſtoppers, to clap on in caſe a topmaſt-ſhroud ſhould be carried away by accident.

The frame of the top is either of deals, laid cloſe together, and nailed to elm-timbers, or open, like a grating, and made of oak-battens. The former is ſtrongeſt and moſt convenient, and is adopted by government, the latter is lighter and cheaper, holds leſs wind, is conſequently leſs expoſed to its effects, and is uſed in the merchant-ſervice.

THE TOP-ROPE paſſes through a block, hooked in an eye-bolt on one ſide of the lower cap, and afterwards through a hole, with a ſheave or pully, at the lower end of the topmaſt; it is then brought upwards on the other ſide of the maſt, and made faſt to an eye-bolt in the cap oppoſite the former. At the lower end of the top-rope is a top-tackle, by which the topmaſt is hoiſted parallel to the lower-maſt.

TOP-ROPE, JIB. A rope by which the jib-boom is hoiſted out.

TREES, ROUGH. Thoſe which are cut down, and only the boughs lopped off.

TRESTLE-TREES. Two ſtrong bars of oak-timber reſting on the cheeks of lower-maſts, or hounds of topmaſts. To lower-maſts they are ſecured, by being ſcored and bolted horizontally on the oppoſite ſides of the maſt, fore-and-aft, and ſupported by two bibbs or brackets, as ſhoulders under them. Topmaſt treſtle-trees are ſupported by the hounds.

TRIMMING. Working any piece into the form and ſhape deſigned by an axe or adze.

TRUCK. An oblate ſpheroid, made of elm, and fitted on maſt-heads.

WEDGES are made of beech or oak to any ſize required, and taper on each ſide from the butt or head. There are fir wedges made large enough to confine the maſt in the partners of the decks.

WINDING. When the edge or ſide of a piece of timber or plank is not a direct plain, but twiſts, it is ſaid to wind, if the contrary, OUT-OF-WINDING, which ſee.

WOOLDING. Several cloſe turns of rope, ſtrained tight round a maſt, yard, or bowſprit.

YARD-ARM. The outer quarter of a yard.

A GENERAL

A GENERAL DESCRIPTION OF MASTS.

LARGE maſts are compoſed of many united pieces of the ſoundeſt part of trees; being thus ſtronger than when made of a ſingle tree, and leſs liable to ſpring. Thoſe for ſhips of the larger rates are of a very complicated conſtruction; and, in proportion as they diminiſh in ſize, they become more ſimple; till at length they are compoſed of ſingle trees only.

The preſent practice of making the largeſt maſts is by a SPINDLE, or UPPER-TREE, two SIDE-TREES, with their HEEL-PIECES, SIDE-FISHES, CHEEKS, FRONT-FISH, CANT-PIECES, and FILLINGS.

The SPINDLE, or UPPER-TREE, is made of two pieces (the ſubſtantial part of two leſſer trees) coaked one into the other in the middle, and bolted together with bolts five feet aſunder, and it tapers towards the upper and lower ends. The ſpindle of ſome maſts is made of a ſingle tree. [*Pl.* II. *fig.* 5.]

The SIDE-TREES of large maſts are made of two pieces, as above, coaked one into the other in the middle, and bolted together with bolts ten feet aſunder. [*Pl.* II. *fig.* 1.] Side-trees of ſmaller maſts are made from one tree; and, after they are ſo made, are coaked into the lower taper or tongue of the ſpindle, and below that into each other, and bolted through all with bolts

five feet aſunder. The diameter athwartſhips is gained by the ſide-trees and ſpindle.

The HEEL-PIECES are ſhort pieces, ſcarfed on the lower part of the ſide-trees, to make good their deficient length. They are often worked ſhort, to gain ſubſtance in the middle. [*Pl.* II. *fig.* 2 & 3.]

The SIDE-FISHES are long planks of fir, let in and coaked into the flat ſurface made by the ſide-trees and ſpindle, of ſufficient thickneſs to gain the diameter required fore-and-aft. [*Pl.* II. *fig.* 11.]

The maſt, thus far completed, is rounded, and ſecured by ſtrong IRON HOOPS driven on the outſide. [*Pl.* III. *fig.* 10.]

The CHEEKS are large pieces of fir (formerly oak) coaked or tabled into the upper taper or tongue of the ſpindle, and ſufficiently thick to faſhion out the head of the maſt, and leave a ſtop for the ſupport of the treſtle-trees: they are bolted together and ſecured by ſtrong iron hoops on the ſquare part or head. [*Pl.* II. *fig.* 8 & 9.]

The FRONT-FISH, or PAUNCH, is a long plank of fir, hollowed to the convexity of the maſt, and faſtened on the fore-ſide of the maſt over the iron hoops. [*Pl.* II. *fig.* 12.]

The CANT-PIECES and FILLINGS are various pieces of fir: the former make good the angles occaſioned by the ſide-trees and ſide-fiſhes, and the latter form a fair round with the ſide of the maſt and the upper part of the front-fiſh, for the conveniency of woolding. [*Pl.* II. *fig.* 17.] The whole is then ſtrongly woolded together, between every hoop, with thirteen cloſe turns of rope, each turn ſecured by woolding-nails, with leather under their heads to prevent their cutting. [*Pl.* II. *fig.* 13.]

Maſts of leſs diameter than the former are conſtructed of two trees, called the UPPER and LOWER TREE, [*Pl.* IV. *fig.* 34.] which are ſcarfed and coaked together in the middle; the upper part forming the tongue for the reception of the cheeks. The lower tree ſometimes has the addition of a HEEL-PIECE to make good the length of the upper tree; and the two trees give the diameter the fore-and-aft way; then, with the addition of two

SIDE-

SIDE-FISHES, [*Pl.* IV. *fig.* 10,] the maſt is completed for HOOPING, and the CHEEKS are then let on.

In fitting maſts, particular attention ſhould be paid to place the rounding ſides of curved or crooked maſts forward

BOWSPRITS of large ſhips are made ſimilar to the above; [*Pl.* I. *fig.* 27, & *Pl.* III. *fig.* 27,] but, when made of a ſingle tree, not ſufficiently large to obtain the diameter required, it is common to make good ſuch deficiency by a fiſh or paunch of fir, extending the whole length, and run coaked and fayed cloſe to a ſurface made on the upper ſide for that purpoſe, nailed faſt to the ſame, and ſecured by wooldings, as the maſts are. This method of ſtrengthening maſts, bowſprits, &c. is commonly uſed at ſea, when ſprung or otherwiſe weakened, by fiſhes made of fir, oak, plank, anchor-ſtocks, or ſuch materials as can be had.

METHOD

METHOD OF

CONVERTING AND LINING TREES

FOR

MADE-MASTS, &c.

THE converſion of trees or timber to the beſt advantage is of great importance, otherwiſe much unneceſſary expenſe and waſte muſt occur, and the greater number of pieces any maſt is compoſed of, the more judgement is required to ſuit each piece with a tree the neareſt to its ſize The moſt approved method is, to delineate the various pieces the maſt is to be compoſed of, by a convenient ſcale of any part of an inch to a foot, upon a ſmooth board or paper, [as in *Pl.* II.] that the different lengths and thickneſſes may be taken, ſo that the moſt ſuitable trees may be provided.

Trees not quite ſtrait, if ſufficiently large, may be uſed, the workmen having always an opportunity of ſetting them ſtrait, when required.

Every tree appointed to make a maſt, yard, bowſprit, or any part thereof, ſhould be examined whether ſound and fit; for which purpoſe a ſhort piece is cut off the butt, or largeſt end, to ſee whether the heart of the tree is ſound. If it has white pithy veins,

is

is rotten, or ſhaky at the heart, it is bad: if ſo, continue taking off more pieces while there remains ſufficient length. When the butt is approved of, ſearch along the ſides, by dubbing or hewing ſpots, at a little diſtance aſunder; and carefully examine every knot, rindgall, &c. If ſound and clear of ſap, line and meaſure it to the thickneſs and length intended.

LARGE LOWER MASTS.

TREES FOR THE SPINDLES

of made-maſts line in length five-ſevenths the length of the whole maſt: ſide them fore-and-aft two-thirds the whole diameter of the maſt, if the trees will admit, [*Pl.* II. *fig* 4,] if not, three-fifths the diameter of the maſt, and ſo continued to the haunch of the ſide-ſiſhes, and above the butt of the ſide-ſiſhes to the ſize of the maſt-head. The thickneſs of the coaks to be allowed, when ſpindles are compoſed of two trees.

The ſize of the ſpindle athwartſhips is ſet off tapering from a middle line to half the given diameter at the ſtop of the hounds, and is to haunch in, three inches on each ſide, four feet below the butt of the ſide-trees, [*Pl.* II. *fig.* 5,] and from thence it lines ſtrait to half the given diameter at the ſecond quarter, and then tapers to half the ſize of the ſtop at the butt. Above the butt of the ſide-trees, the upper part tapers to five-thirtieths of the given diameter at the head. The thickneſs of the coaks for faying is to be added.

SIDE-TREES

are ſided to the ſize of the ſpindle, the fore-and-aft way, and the thickneſs of the coaks added when a ſide-tree is compoſed of two pieces. [*Pl.* II. *fig.* 1.]

The breadth athwartſhips, from the heel of the maſt to the butt of the ſpindle, is one-half the diameter, adding the thickneſs of the coaks. It is the ſame from thence to the ſecond quarter, deducting

ducting the ſubſtance of the ſpindle. At the third quarter (ſpindle included) the breadth is eighteen twenty-fifths of the given diameter, and at the haunch one-fourth of the breadth of the ſpindle at the ſtop of the hounds. Trees, not of ſubſtance to admit the ſide-trees working their whole length, are made good with heel-pieces, ſcarfed underneath at their lower ends. [*Pl.* II. *fig.* 1.] The ſcarf lines in length one-third or one-half the length of the heel-piece, with a butt at the upper end one-ſixth of the depth, and at the lower end three-ſevenths the ſubſtance of the ſide-tree, and a hook-butt in the middle of one inch or more. [*Pl.* II. *fig.* 2 & 3.]

HEEL-PIECES

are ſided to the ſame ſize as the ſide-trees, and are ſawed with a ſcarf, to fit that left in the ſide-tree.

SIDE-FISHES

are commonly ſawed out of one tree, down the middle, and one-fourth the diameter of the maſt ſet off on each ſide for the thickneſs the breadth two-thirds the given diameter, and forty forty-one parts of that breadth at the firſt quarter, eleven-twelfths at the ſecond, five-ſixths at the third, and two-thirds at the upper end, and a parallel breadth from the gun-deck to the butt. [*Pl.* II. *fig.* 11.]

FRONT-FISH

is the ſame as the ſide-fiſhes. [*Pl.* II. *fig.* 12.]

CHEEKS

line in length, for the main-maſt, nine-twentieths, [*Pl.* II. *fig* 9,] for the fore-maſt three-ſevenths; and for the mizen-maſt two-fifths, the length of their maſts. They line ſtrait on the inſide from the upper part, and are ſet back, for the length of the head and ſtop of the hounds, ſix* inches for every yard in the length

* This length of maſt-heads for the royal navy is by a recent order of government, which adds one inch in every yard of the length to the former practice

of the maſt; but mizen-maſts are ſet back only five inches for every yard in length: and ſeven-fifteenths of that length are allowed for the length of the hounds. Breadth of the cheeks at the head, two-thirds the given diameter of the maſt, and three-fourths at the ſtop and lower part of the hounds. In the middle, between the hounds and the lower end, eleven-twelfths of the breadth at the ſtop, and at the lower end half the given diameter. Allow the thickneſs of the coaks, when made of two pieces. The thickneſs of the cheeks is ſet off from the inſide. The upper part above the ſtop to be one-fourth the given diameter, and a ſtop left to project full half that thickneſs; the lower part of the hounds one inch more than the thickneſs of the upper part, or head. From thence line ſtrait to five-ninths of the head at the lower end. [*Pl.* II. *fig.* 8.]

LOWER-MASTS MADE OF TWO TREES.

THE TWO TREES

line the whole length of the maſt, when ſufficient; if not, the deficiency is made good by a piece at the head and heel. [*Pl.* IV. *fig.* 11 & 34.] Both trees are ſided athwartſhips to two-thirds the diameter of the maſt, from the heel to the haunch of the ſide-fiſhes, and taper above the butt of the ſide-fiſhes to one-half the given diameter at the ſtop of the hounds, and five-thirtieths at the upper part of the head, adding to the latter the thickneſs of the coaks on each ſide for faying the cheeks.

Each tree lines ſtrait on the inſide, and the diameter of the maſt fore-and-aft is made by the lower tree holding the greater ſubſtance at the heel, and the upper tree on the head, and both one ſubſtance at the ſecond quarter: the thickneſs of the coaks to be added.

FISHES AND CHEEKS

are the ſame as for maſts made with a ſpindle and ſide-trees. [*Pl.* II. *fig.* 11, & *fig.* 8 & 9.]

MASTS MADE OF A SINGLE TREE.

LOWER-MASTS OF A SINGLE TREE.

The tree intended for this purpoſe has a ſtrait line ſtruck along the middle, and the heights of the decks ſet up thereon from the butt. [*Pl.* IV. *fig.* 19.] The middle deck, in three-deck ſhips, and the upper deck, in two-deck ſhips, are the partners. From the heel, ſet up the whole length of the maſt, and from that length ſet back ſix* inches in every yard for the head and ſtop of the hounds, (but five* inches only in the mizen-maſt,) and ſeven-fifteenths that length for the length of the hounds. Then divide the ſpace from the lower part of the head to the partners into four equal parts, and term them quarters; that neareſt the partners the firſt, [*Pl.* IV. *fig.* 22,] the next, the ſecond, [*Pl.* IV. *fig.* 23,] the other, the third. [*Pl.* IV. *fig.* 24.] Large maſts have two quarters between the lower deck and heel. [*Pl.* II. *fig.* 15 & 16.]

The different diameters of the lower-maſts are ſet off at thoſe places by plumbing down one-half on each ſide from the line in the middle, beginning at the partners with the given diameter in the Table of Dimenſions, (and many add one inch more, to give the hoops a quicker drift). At the other decks, the ſame as the given diameter; at the firſt quarter, ſixty ſixty-one parts of the given diameter; at the ſecond, fourteen-fifteenth parts, at the third, ſix-ſevenths, at the lower part of the head, three-fourths, and, at the upper part, five-eighths. Leave a ſtop of four inches and a half, or three inches and a half, according to the ſize of the maſt, at the lower part of the head on each ſide athwartſhips. The di-

* See the note in page 25.

ameter of the firſt quarter, below the lower deck, to be the ſame as the firſt quarter above the partners, the next, the ſame as the ſecond, and, at the heel, to be ſix-ſevenths of the given diameter.

LOWER-MASTS OF A SINGLE TREE, WITH CHEEKS AND FRONT-FISH.

Theſe line tapering athwartſhips, from the lower end of the cheeks to five-thirtieths the given diameter at the head, adding the thickneſs of the coaks for faying the cheeks. The CHEEKS and FRONT-FISH are the ſame as for maſts made with a ſpindle and ſide-trees.

CUTTERS AND OTHER SMALL VESSELS' MASTS AND TOP-MASTS IN ONE.

The top-maſt above the ſtops of the lower-maſt is one-third or one-fourth of the whole length, with hounds, ſtops, and a ſquare head above, ſimilar to ſhip's top-maſts. Sometimes they have a common head, like other lower-maſts, with croſs-trees, cap, and top-maſt, as fancy dictates. The diameters are ſet off as thoſe of other maſts.

TOP-MASTS.

The tree [*Pl.* V. *fig.* 1] has a line ſtruck ſtrait along the middle; and from the butt once and a half the given diameter is ſet up for a block below the heeling, which is twice and a half the diameter from the block, then, from the lower part of the heeling, ſet up the place of the lower cap, (which is the length of the lower-maſt head,) and the whole length of the top-maſt. From that length ſet back, for the length of the head and ſtop of the hounds, five* inches in every yard for the main and fore top-maſts, and four inches and a half for mizen top-maſts, and three-fifths that length below for the length of the hounds. Divide from the lower part of the head to the cap into four equal parts or quarters, [*Pl.* V. *fig.* 7, 8, & 9,] that next the cap is the firſt quarter.

* See the note in page 25

At

At theſe places the different diameters are ſet off as before. At the cap [*Pl.* V. *fig.* 6] the diameter as in Table of Dimenſions; at the firſt quarter, ſixty ſixty-one parts the diameter of the cap; at the ſecond quarter, fourteen-fifteenths, at the third quarter, ſix-ſevenths, at the lower part of the hounds, [*Pl.* V. *fig.* 10,] thirteen-ſixteenths, at the ſtop, [*Pl.* V. *fig.* 11,] nine-tenths, at the lower part of the head, nine-thirteenths, and, at the upper part, [*Pl.* V. *fig.* 12,] ſix-elevenths.

The STOPS on the fore-and-aft ſides are to come up to the underſide of the croſs-trees.

The HEELING to be ſquare, [*Pl.* V. *fig* 4,] and large enough (if the tree will admit) to fill up the treſtle-trees at the lower-maſt head, haunching at the upper part to the diameter of the cap [*Pl.* V. *fig.* 5.]

The BLOCK below the heeling the ſame diameter as at the cap. [*Pl.* V. *fig.* 3.]

The aftſides of top-maſts line ſtrait.

MIZEN TOP-MASTS.

The ſquare heeling [*Pl.* V. *fig.* 13] is ſet up from the butt, having no block, and ſometimes a long pole-head, inſtead of a ſquare head for a topgallant-maſt.

After the length is ſet off, ſet back four* inches and a half in every yard in the length for the ſtop, and three-fifths that below for the hounds. Then from the ſtop ſet up three times that length, and two-thirds more for a long pole-head. The diameter of the upper part of the long pole-head to be two-thirds of the lower part, and line ſtrait the whole length of the pole-head, and all below as the top-maſt.

TOPGALLANT-MASTS

line ſimilar to the mizen top-maſt, and have commonly pole-heads, either ſtump, common, or long. A ſtump pole-head is the length of a ſquare head, [*Pl.* V. *fig.* 24,] a common pole-head is ſeven-eighteenths of the length, ſet up from the ſtop,

* See the note in page 25

[*Pl.*

[*Pl.* V. *fig.* 15,] and a long pole-head is two-thirds the length to the ſtop, and is ſet up as above. [*Pl.* V. *fig.* 14.]

ROYAL-MASTS

line ſimilar to the ſtump-head of topgallant-maſts, and have a ſquare head. They are ſeldom uſed.

BOWSPRITS MADE OF TWO TREES.

THE TWO TREES

are lined two-thirds the diameter athwartſhips, and each tree to one-half the diameters fore-and-aft, adding the thickneſs of the coaks. [*Pl.* I. *fig.* 27, & *Pl.* III. *fig.* 27.]

THE SIDE-FISHES

are commonly ſawed out of one tree ſtrait down the middle, and one-fourth of the diameter ſet off on each ſide for the thickneſs. The length is the whole length of the bowſprit.

BOWSPRITS MADE OF ONE TREE.

Bowſprits made of one tree [*Pl.* IV. *fig.* 27] have a ſtrait line ſtruck along the middle, and the bed ſet up from the butt three-tenths the length of the bowſprit, and ſix inches added. Then ſet up the whole length from the butt, and within that length four inches for every yard, for the long ſquare on the upper ſide, and one-third that for the ſhort ſquare on the under ſide. Then divide between the bed and outer end into four equal quarters; that next the bed is the firſt quarter, and ſet off the diameters as before; at the bed [*Pl.* IV. *fig.* 29] as in the Table of Dimenſions; at the firſt quarter, [*Pl.* IV. *fig.* 30,] ſixty ſixty-one parts of the diame-

ter

ter at the bed, at the ſecond quarter, [*Pl.* IV. *fig.* 31,] eleven-twelfths, at the third quarter, [*Pl.* IV. *fig.* 32,] four-fifths: at the outer end, [*Pl.* IV. *fig.* 33,] five-ninths, and, at the heel, [*Pl.* IV. *fig.* 28,] ſix-ſevenths. they are then to be lined to that ſize with a fair curve.

YARDS MADE OF TWO TREES.

Yards, made of two trees, [*Pl.* II. *fig.* 39,] have each tree lined long enough to ſcarf four feet beyond the firſt quarter next the middle or ſlings, which is in all five-eighths the length of the yard, adding four feet; then ſtrike a ſtrait middle line, and ſet up from the butt four feet from the haunch: from thence one-eighth of the length of the yard from the middle, and the ſame on the other ſide for the length of the ſcarf, [*Pl.* II. *fig.* 40] from the middle to the end it is divided into four quarters, that next the middle is the firſt. The diameters are ſet off at the ſlings, [*Pl.* II. *fig.* 45,] as in the Table of Dimenſions. At the firſt quarter, on each ſide, [*Pl.* II. *fig.* 44 & 46,] thirty thirty-one parts of the diameter in the middle; at the ſecond quarter, [*Pl.* II. *fig* 43 & 47,] ſeven-eighths, at the third quarter, [*Pl.* II. *fig.* 42 & 48,] ſeven-tenths, and, at the outer ends or arms, [*Pl.* II. *fig.* 41 & 49,] three-ſevenths. They are then lined and ſided to that ſize, then canted, and a middle line ſtruck on one of thoſe ſides, and the middle and the quarters ſquared up thereon from the middle line on the firſt ſide, and the ſame diameters ſet off as before, then lined and made ſquare to the upper ſide. The ſcarfs line ſtrait, from each quarter next the middle, to one-fourth the ſubſtance at the quarter next the butt, and three-fourths at the quarter next the middle, and haunches to about three inches at the butt. Theſe are the main and fore yards of large ſhips only

YARDS MADE OF ONE TREE.

All yards made of one tree line as the former, the ſcarfs excepted.

MIZEN-YARDS.

Their diameters [*Pl.* V. *fig.* 60] are ſet off from a line in the middle, as the former, but differ as follow. They are to be of the given diameter in the Table of Dimenſions, at the ſlings, which is one and one-half the diameter below the middle. At the firſt quarter, next the ſlings of the upper arm, thirty thirty-one parts of the diameter at the ſlings; at the ſecond quarter, ſeven-eighths; at the third quarter, ſeven-tenths, and, at the arm, two-fifths. At the firſt quarter of the lower arm, ſixty ſixty-one parts; at the ſecond quarter, eleven-twelfths, at the third quarter, five-ſixths; and, at the arm, two-thirds. When timber is ſcarce, yards are ſometimes lengthened at the arm, where the wood is not ſufficient to gain the whole length. [*Pl.* II. *fig.* 50.] They only differ from the former by having a tongue at the end, lengthened and tapered to one-eighth the ſubſtance from one-third the length of the arm-piece, and a butt on each ſide, one-ſixteenth the diameter. The arm-piece is cut to make good the length of the yard-arm, with jaws in the largeſt end, to receive the tongue. This method is much uſed at ſea, when the yards are damaged at the arms.

LOWER-YARDS OF MERCHANT-SHIPS

commonly have a ſquare place raiſed at each yard-arm for a ſheave-hole for the topſail-ſheets, and ſometimes the cleats, or ſtops, are raiſed from the ſolid of the topſail and other yards. [*Pl.* V. *fig.* 44.]

OF

OF SAWING OR HEWING MASTS AND YARDS FOR PUTTING TOGETHER.

Maſts, bowſprits, and yards, after they are lined, have their ſides hewed or ſawed perpendicular to the lines of the upper ſurface; placing them in ſuch a manner as to gain the greateſt ſubſtance clear of rot or ſap. If hewed, the ſides are hewed-in at different places, about four feet aſunder, until the plumb-line is perpendicular to the line ſtruck on the ſurface the rough wood between theſe diviſions is hewed off, to agree with the ſpots plumbed down.

After a maſt, yard, &c. or any part thereof, is ſided, it is canted, and a ſtrait middle line ſtruck along the upper ſide; then the quarters and other diviſions are ſquared up from the firſt middle line, and the ſizes or diameters ſet off, as before, from this new middle line. The ſides are then hewed or ſawed ſquare to the ſurface from thoſe lines. If ſawn, the timber muſt be wedged up ſo that the upper ſurface be perfectly horizontal and the ſides perpendicular to it, which is done by placing the ſtock of a ſquare on the upper ſurface, and its tongue made perpendicular by means of a plumb-line.

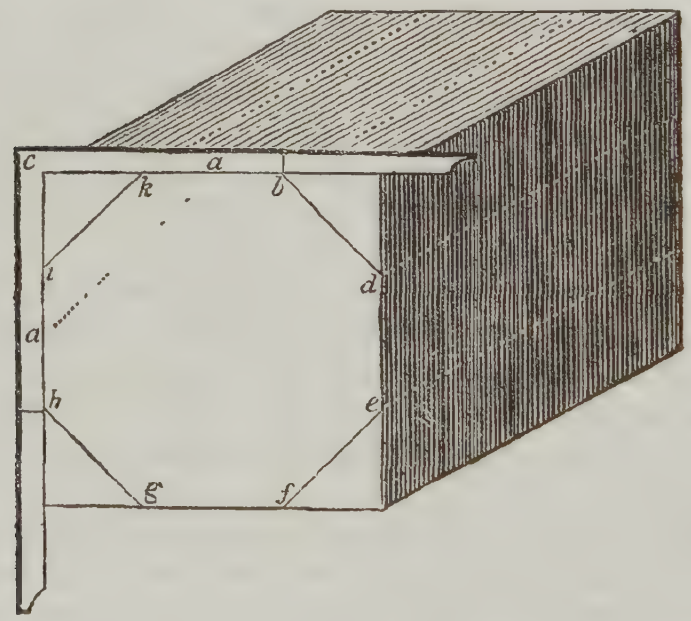
If hewed, the line or lines on the upper ſurface are tranſmitted to, and ſet off on, the under ſide, by compaſſes, taking the diſtances from the inſide of the tongue of a ſquare applied to the upper ſurface. This is repeated at the quarters, and, where neceſſary, for lining. Pieces that are ſtrait need only one ſpot ſquared down at each end.

Obſerve, the under ſide of the ſtock of the ſquare ſhould be kept out-of-winding from one particular place. Suppoſing that place to be near the middle, a batten with a ſtrait edge muſt be laid acroſs, and there kept fixed againſt the ſide of the maſt or piece, to which the under ſide of the ſquare muſt agree, by ſeeing the two edges parallel with each other. The ſame may be performed by two battens. Let one ſquare ſpot be hewed, to which one batten muſt be held, and the other batten looked out-of-wind-

ing at ſuch diſtances as are neceſſary, and, when the edges of two battens agree, take, with compaſſes, what the line on the ſurface is within the edge of the ſquare, or batten, and in the ſame direction ſet that gage within the edge of the batten, or ſquare, on the oppoſite or under ſide, and a line is then ſtruck to range through theſe ſpots. The more curve there is, the greater number of ſpots are neceſſary.

The ſides are then eight-ſquared thus, viz. Five twenty-fourths of the diameters are ſet off on each ſide the middle line, on every ſide, or ſeven twenty-fourths ſet in within the edges, and lines ſtruck with fair curves; then the angles or edges are taken off ſtrait to the lines on each ſide. Here the maſt-maker may be readily aſſiſted by his rule, it having the proper diviſions; and is particularly explained hereafter.

But, in the eight-ſquaring of timber, the moſt expeditious, as well as correct, method is by means of the ſquare, thus



The timber being ſquared or ſided, let the middle line be marked on the ſide lying upwards. To this apply the ſquare, as ſhewn in the figure, and mark on each arm thereof the place of this middle line, *a a*. If, then, the hypotheneuſe line, *a a*, be ſet off from the angle upon each arm of the ſquare, (as *c b*, *c h*,) theſe marks

marks will ſhew how much is to be taken off from the angles of the timber, to reduce it to an eight-ſquare. For, applying the ſquare to each ſide of the timber in turn, the ſpots, *b* and *h*, will be found to touch the timber at *b*, *d*, *e*, *f*, *g*, *h*, *i*, *k*; and to thoſe lines the corners are to be taken off, by which the timber will become an eight-ſquare, conſiſting of theſe eight ſides, viz. *b d*, *d e*, *e f*, *f g*, *g h*, *h i*, *i k*, *k b*.

LOWER-MASTS are lined eight-ſquare from the heel to the lower part of the hounds, except they have cheeks, then, to the lower part of the cheeks, and from thence break off, on the fore-and-aft ſides, to the breadth of the cheeks at the lower part of the head.

TOP-MASTS, from the upper part of the heeling to the under part of the hounds, are eight-ſquared, as alſo the block below the heel of main and fore top-maſts.

TOPGALLANT-MASTS and MIZEN TOP-MASTS, with long pole-heads, are eight-ſquare from the upper part of the heeling to the under part of the hounds, and above the ſtop to the upper part of the pole-head

BOWSPRITS are eight-ſquared from the heel to the ſquare part at the outer end, except thoſe of cutters or veſſels that have their bowſprits upon deck they are left ſquare within the bow one-fourth the length.

YARDS in general are eight-ſquared, except thoſe lower ones in the merchant-ſervice that have ſquare parts left for the ſheave-holes and boom-irons at their arms or outer ends.

Sawing is beſt and cheapeſt, eſpecially for large maſts, as the ſlabs ſawn off ſerve for fillings, cant-pieces, &c. beſides that workmen, by hewing where much wood is to come off, are apt to ſcore or wound the maſt, which ſhould be carefully avoided.

THE

PUTTING TOGETHER AND COMPLETING

OF

Maſts, Bowſprits, Yards, &c.

MASTS COMPOSED OF SEVERAL TREES.

SPINDLES OF MASTS,

compoſed of two pieces, are coaked together in the middle, with a coak-and-plain four feet long. [*Pl.* II. *fig.* 4 & 5.] Half the ſpindle is raiſed upon blocks, with the middle ſurface upwards, and planed ſmooth. The blocks are long enough to reach through a little diſtance on each ſide, for ſetting the ſpindle ſtrait, if required. A ram-line is made faſt in the middle of one end, and hauled tight; it is then faſtened in the middle of the other end, and, where a ſpindle deviates from a ſtrait line, a block ſhould be fixed underneath, and a cleat nailed thereon, and the place ſet ſtrait, by wedges driven between the cleat and the ſpindle. A middle line is then ſtruck on the ſpindle, ſtrait with the ram-

ram-line, and ſquared down at each end. The length of the coaks is then ſet up from the butt, firſt, three feet ſix inches from the butt, and four feet from that for the firſt coak, and ſo on by four feet to the upper end, ſquaring them acroſs from the middle line, and down on each ſide. The breadth of the coaks is lined, to have two inches good wood when the ſide-trees are coaked on and placed in the middle. The coaks are ſunk from one inch and a quarter to one inch and a half, and are cleared out by a mallet and chiſſel. Be careful to ſink the coaks no deeper than the gage, as the maſt is weakened thereby. After the coaks are ſunk, and cleared out, the other half of the ſpindle is canted on, with its middle ſurface to the other, and ſet ſtrait and cloſe, with croſs-ſetts where neceſſary. The butts of the coaks are then ſquared up, upon each ſide of the upper half, from the ſides of the lower one, and the middle line at each end. The diſtance between is then taken with compaſſes, and to that is added the thickneſs of the coaks, and that gage pricked off from the ſurface of the lower half to the ſides of the upper one, and a line ſtruck on each ſide to range through the ſame. The upper half is then canted off upon blocks, and a ſtrait line ſtruck along the middle to that ſquared up at each end from the lower one. The butts of the coaks are then marked acroſs and lined to their breadths, and ſawed acroſs to the line on each ſide, and the intermediate wood, and that on each ſide the coaks, dubbed away ſtrait, the coaks only remaining. A ſcore is taken out of the middle of a batten to go over the coaks, and ſo uſed to prove it ſtrait. Obſerve, the coaks are to remain no higher above the ſurface than the depth of thoſe ſunk in the other half. Before the pieces are canted together, let a ſmall chamfer be taken off the edges of the coaks, and both ſurfaces tarred with ſoft tar; then cant one on the other into its place, and both muſt be ſet cloſe together with croſs-ſetts, and bolted with bolts, from one inch to three-quarters diameter, five feet aſunder, through holes bored in the middle with an auger one-quarter of an inch leſs than the ſize of the bolts. The bolts muſt not be driven quite through, that the ſpindle may be reduced where neceſſary.

SIDE-TREES,

each compoſed of two pieces, [*Pl* II. *fig.* 1 & 6,] are coaked together in the middle, ſimilar to the ſpindle. Each piece of the ſide-tree is often worked ſhort of the whole length, the deficiency being made good by pieces ſcarfed to them at the heel, [*Pl.* II. *fig.* 2 & 3,] in the following manner; viz. half the length of the ſcarf is the length of the coaks, which are three inches broad, and are placed at the end of each other on each ſide the middle line; that next the butt is ſunk to one inch and three-eighths, and the next raiſed one inch and three-eighths.

The coaks that unite the pieces of a ſide-tree together in the middle contain an equal part of the ſide-tree and heel-piece in their breadth along the ſcarfs, and all above is divided into a coak-and-plain four feet long, and one-third the thickneſs of the ſide-tree broad, and lined neareſt the inſide edge, to have two inches good wood. When the ſide-trees are coaked to the ſpindle, they are fayed and bolted together, through the middle, with bolts one inch to three-quarters diameter, ten feet aſunder, except in the ſcarf. There ſhould be two bolts in each ſcarf, and the firſt bolt two feet above the heel or butt of the ſide-trees.

After the ſide-trees are bolted together, their inner ſurfaces are planed ſtrait and fair, and the haunch, at the butt, at the upper ends, diminiſhed from four feet to two or three inches, a ſtrait line is then ſtruck along the middle of the ſurface, ſquared down at each end, and the coaks ſet off. From the lower end ſet up two feet for the butt of the firſt coak, and let its breadth be one-third the breadth of the ſide-tree, and placed in the middle, within the haunch at the upper end. The intermediate ſpace is divided into a four-feet coak-and-plain, the butts of the coaks on one ſide to come to the ends of thoſe oppoſite, and all the butts to be ſquared acroſs from the middle line and down the ſides. The breadth of the coaks to be one-fourth the breadth of the ſide-tree, and half their breadth from the middle line on each ſide, and ſunk to one inch and a half, or leſs, as before. The ſide-tree thus completed is canted upon the tongue, or lower part, of the ſpindle, and ſet ſtrait and cloſe with croſs-ſetts. Then ſquare down the

the butts of the coaks, the haunch, and the middle line at the ends, from the ſides of the ſide-tree to the ſides of the ſpindle, then, with compaſſes, take the diſtance they are aſunder, and the thickneſs of the coaks, and ſet off that gage from the under ſide of the ſide-trees to the ſides of the ſpindle, and ſtrike the line.

The ſide-tree is canted off, and a line ſtruck on the middle of the ſpindle to the ſtops ſquared down, the butts of the coaks ſquared acroſs, and their breadth taken from the middle line of the ſide-tree, and ſet off from that on the ſpindle, the coaks are then raiſed as before, chamfered, tarred, and canted again on the ſpindle into its place, and ſet cloſe. Thus the ſpindle and ſide-tree are canted that the other ſurface of the ſpindle may lie upwards, for coaking on the other ſide-tree. The whole is then bolted together, with bolts from one inch to three-quarters diameter, five feet aſunder, and the holes bored through the middle of the coaks. The haunch, being leſs in ſubſtance, is faſtened to the ſpindle with dump-nails.

The maſt is then canted, and hewed to its ſize athwartſhips, from a ſtrait line ſtruck along the middle of the fore-and-aft ſide. The height of the partners, quarters, &c. are then ſet up, and the different diameters ſet off and lined as before-directed.

The maſt is again canted, and a middle line ſtruck on the athwartſhip-ſide, it lying upwards, from the heel to the head, and the partners, quarters, &c. ſquared up from the firſt middle line; then line the maſt for the eight-ſquare, by ſetting off five twenty-fourths the diameter of each place from both ſides the middle line, from the heel to the lower end of the cheeks, and from thence to line off to nothing at the lower part of the head. Set down the ſides below the edge, as much as the line for the eight ſquare is within the edge, allowing three-eighths of an inch for reconciling. When the fiſh is on, lines are then ſtruck to theſe ſpots, and the wood between them dubbed away ſtrait from line to line. The other 'thwartſhip-ſide is then canted up and eight-ſquared.

The maſt is again canted, and one of the fore-and-aft ſurfaces laid upwards, for coaking on the ſide-fiſh [as ſhewn in *Pl.* II. *fig.* 7]. The butts of the coaks are ſet up from the heel on the middle line, and ſquared acroſs thus: The butt of the loweſt coak

to

to be three feet above the heel, and three feet nine inches in length, the next coaks come among the ſcarfs of the heel-pieces, and are ſo diſpoſed as to have two coaks in length, in a ſhort ſcarf, and three in a long one, and the breadth of the coaks to come equally on each piece Above the ſcarf to the ſecond quarter to have a coak-and-plain four feet long, one on each ſide the middle line, and the butts on one ſide to come in the middle of the coaks on the other, and ſquared acroſs from the middle line. The coaks to be in breadth one-third the breadth of the fiſh, and equally placed between the middle line and edges of the fiſh. All above the ſecond quarter are ſingle coaks, placed in the middle, of the ſame length as the lower ones, and to be eight inches broad, the upper one five inches; a line, ſtruck from one to the other, gives the breadths of the intermediate coaks. Every butt muſt be ſquared from the middle line, and raced acroſs from ſide to ſide.

SIDE-FISHES

are planed ſtrait and fair on the inſide ſurface and edges, [*Pl.* II. *fig.* 11,] then canted on the maſts, and ſet ſtrait and cloſe to the middle line, the breadth of the fiſh is then marked on the maſt, and the butts of the coaks ſquared up from the maſt on to the ſides of the fiſh, and the middle line at the ends. The fiſh ſhould be ſunk in the maſt and raced along its ſides with compaſſes, from the ſurface of the ſide-trees and the haunch at the upper end. The fiſh is then canted off, and a middle line ſtruck on the inſide, and the butts of the coaks raced acroſs, that their breadths, taken from the maſt, may correſpond. The coaks are raiſed on the maſt, by taking away the intermediate wood, to the breadth and depth which the fiſh is to be let into the maſt, being from one inch and a half to two inches in large maſts, and the coaks, left above that ſurface, are from one inch and one-eighth to one inch and three-eighths, and are ſunk to the ſame depth in the fiſh. The whole to be cleared out, and the edges taken off with a chamfer, the ſurfaces tarred, and the fiſh again canted on the maſt into its place, ſet cloſe down with croſs-ſetts, and faſtened to the maſt with dump-nails, twice the thickneſs of the fiſh in length. The

ſide-fiſh on the oppoſite ſide of the maſt is coaked on in the ſame manner.

SQUARING.

The maſt is now ſquared to its ſize, the fore-and-aft way, by a ſquare or batten: the latter is laid acroſs the fiſh parallel to the middle line on each ſide, and what it exceeds the half diameter of the maſt is ſet below the edge of the batten on each ſide of the fiſh, and this is repeated at the partners, quarters, &c. then lined with a fair curve to the ſame, and the wood dubbed off ſtrait to the line on each ſide. A ſtrait line is then ſtruck along the middle, and the eight-ſquare lined from it as before, and dubbed ſtrait through to the 'thwartſhip-ſides.

In the remaining angles, between the ſurface of the maſt and the ſides of the fiſh, are fayed and nailed CANT-PIECES, which are dubbed ſtrait with the eight-ſquare. The maſt is then canted twice, for the other ſide to be ſquared and finiſhed in the ſame manner.

The maſt is then SIXTEEN-SQUARED, thus: Divide the eight-ſquare into four equal parts, and ſtrike a line to range through the diviſions next the edges or angles, which are dubbed off to thoſe lines. The maſt is then rounded and planed ſmooth from the heel to the hounds, except the ſurfaces left for coaking on the cheeks, which are rounded a little at the lower part, one-third their length.

HOOPING.

The maſt, thus far completed, is HOOPED. [*Pl.* II. *fig.* 13] the upper mould-hoop is placed in the middle of the hounds, and the other equally ſpaced between that and the loweſt mould-hoop, which ſhould be eight inches above the lower end of the cheeks. The other hoops are circular, and divided into two drifts. The upper drive on from the head of the maſt, and the loweſt hoop comes within two feet of the partners: the reſt are equally ſpaced, about four feet aſunder. The lower drift drives on from the heel of the maſt, the upper hoop being placed within two feet of the partners, and the others about two feet each way clear of the

the decks. Below the decks the hoops are equally divided, to the heel-hoop, which is one foot ſeven inches above the heel of the maſt.

Moulds are made to the upper hoops, that are not circular, as a guide for the ſmith: they are fayed to the ſhape of the maſt, and nailed together, at the corners, one foot from the ſtation of each hoop, and the number of the ſtation marked on the upper ſide. Circular hoops are made to girths taken round the maſt at the ſtations of the hoops. That they may be tight, one inch is cut off the girth of the firſt hoop of each drift, after it is fitted to the maſt, and gradually increaſes, cutting off from the other girths to one inch and three-eighths at the girth of the laſt hoop: the other drift the ſame. Obſerve, the firſt hoop of each drift is the largeſt. The hoops are made of iron, four to four inches and a half broad, half an inch or five-eighths thick, and the edge that firſt goes on the maſt is chamfered on the inſide.

The hoops are heated nearly red, then driven on the maſt to their ſtations by long round bars of iron, called pokers, flatted on the feet. They are ſwung backwards and forwards by the workmen, ſtriking the edge of the hoop on each ſide of the maſt, which is well greaſed with tallow, to facilitate the driving the hoop, and prevent the maſt from burning. The hoop, when driven to its ſtation, is cooled with water, which ſhrinks it and increaſes the tenſion. The upper drift and mould hoops are driven on from the head, and the lower drift from the heel, of the maſt.

CHEEKS

made of two pieces [*Pl.* II. *fig.* 8, 9, & 10] are coaked together in the middle, [either in the way ſhewn in *Pl.* I. *fig.* 35, or *Pl.* II. *fig.* 8,] and the edges planed ſtrait and ſquare. Then ſet off the coaks, the butt of the firſt is to be one foot above the lower end of the cheek, and from thence to the head divided into coaks and plains three feet in length each. The butt of the coak to be nine inches ſhort of the ſtop, and the breadth of the coak at the upper end one-third the thickneſs, and placed in the middle, and the remainder lined from the inſide edge, ſo as to leave a two or

three inch margin on the outer edge, and ſunk one inch and an eighth deep. The other half is then canted on and ſpoiled for faying as before, and, when fayed cloſe, the pieces are bolted together through the middle with bolts ſeven-eighths of an inch diameter; the firſt bolt five feet from the lower end, and the others four feet aſunder, and not driven quite through. The breadth of the cheeks is next ſet off from a ſtrait line ſtruck along the middle, and the edges trimmed ſquare and planed ſmooth with the inner ſurface, and then the exact thickneſs ſet off from the inſide. The outſide of the cheek, at the lower part, is rounded from the lower end to the hounds, and two-thirds the thickneſs of the cheeks is ſet up from the inſide on the foremoſt edge, and one-third on the after edge, and a line ſtruck. Below the line remains ſquare, and above is divided into two equal parts on each ſide, and a ſtrait line ſtruck along the back of the cheek, from the lower end to the under part of the hounds, one inch and a half from the middle line towards the foremoſt edge, and from thence dubbed or bearded ſtrait to the firſt line, down on each edge. Then another line is ſtruck in the middle of that bearding on each ſide, and again bearded from thence to the next line upon the edge. Then divide each of thoſe ſquares into four equal parts, and ſtrike lines to the diviſions next the edges, and dubb the edges off to the line on each ſide, then round it ſmooth with planes, and bring the rounded part of the cheek in with a ſweep at the lower part of the hounds. Above the hounds to the ſtop, a large chamfer is taken off the after edge of each cheek. The head of the cheeks above the treſtle-trees is bearded on the outſides, from one-third the breadth to three-eighths of an inch down on each edge.

The cheeks are then canted, the inner ſurface to lie upwards, on which a ſtrait line is ſtruck along the middle, and ſquared down at each end, then, with a ſtaff laid along the maſt, ſet off the ſtations of the hoops from the lower end of the cheeks, do the ſame on the middle line of the cheek, then diſpoſe the coaks thus: Set down eighteen inches from the upper end of the cheek for the butt of the firſt coak, and three feet ſix inches for its length, which, ſquared acroſs, makes the firſt butt of the coak: and from thence to the hoop below the hounds on the oppoſite

ſide

ſide all the coaks are to be the ſame length, if the upper part of the cheek admits. The other coaks are equally divided in length between the hoops; the whole to be ſix inches broad, and placed half their breadth on each ſide the middle line the laſt coak is to be one-third the breadth of the cheek, and placed in the middle at three-fourths the length of the cheek from the head. The cheeks are then canted on the upper part of the maſt, and laid ſtrait with the middle line on the maſt, and ſet cloſe. Then ſquare down all the butts of the coaks upon the maſt, and the butt of the hollow, and each ſide of the hoops to the ſides of the cheeks. Then, from the under ſide of the cheeks, ſet down upon the maſt on each ſide (with compaſſes) one inch and a quarter, the depth of the coaks, and ſtrike a line to the ſame parallel with the edge of the cheek. The cheek is then canted off, and the butts of the coaks raced acroſs on the maſt, and the edges of the hoops upon the inſide of the cheeks, and the breadth of the coaks correſpondently taken from the middle line on the cheek, and ſet off from the middle line on the maſt, the coaks on the cheeks to be ſunk one inch and a quarter deep, and raiſed the ſame on the maſt. One-fourth the length of the cheek from the lower end is hollowed to the convexity of the maſt. The workman, to perform this with exactneſs, bends a piece of iron hoop round the maſt, and hollows the cheek to the ſame, leaving a margin at each ſide twice the thickneſs of the hoops, which are let in the cheek their thickneſs in the hollow, and the depths of the coaks beſide.

Cheeks, made of one piece, ſometimes table on to the maſt-head thus: Eighteen inches is ſet down from the upper end of the cheek for the firſt butt, and twenty-two inches from thence for the length of the tables, and that continued as low as the firſt half of the cheek, and from thence to three-fourths the length of the ſame, dividing into running coaks [as *Pl.* I. *fig.* 34] three feet in length. The butts of the coaks and tables are all ſquared acroſs from the middle line and down the ſides, and the breadth of the tables within three inches of each edge from the middle line, and one table ſunk one inch and a quarter deep, the other left alternately on each ſide the middle. The coaks to be ſix inches broad, the firſt next the tabling placed in the middle. The others placed

four

four inches on each ſide the middle line alternately, and the remainder of the cheek hollowed as before.

The edges of the coaks and tables, after they are ſunk and cleared, are chamfered, and the ſurface of the cheek, and the maſt where it fays, is paid over with ſoft tar; the cheek is then canted on the maſt into its place, and ſet cloſe as before. The maſt is then canted twice, and the oppoſite cheek completed in the ſame manner.

The edges of the cheeks are rounded above the upper ſide of the treſtle-trees to the under ſide of the cap, nearly.

The cheeks are farther ſecured to the upper part of the ſpindle by hoops, bolts, and nails, at follow: Seven hoops on the head of large made-maſts, and five or ſix on ſmaller. The upper hoop to be its breadth below the under ſide of the cap, the others equally ſpaced on the head of the maſt, and to have one hoop its breadth below the ſtops: moulds are made to the hoops as before. There are to be two bolts between every hoop on the maſt-head, driven through the cheeks athwartſhips, one at one edge, the other at oppoſite angles, except at the upper and lower hoop, which are to have one bolt at each edge clear of the treſtle-trees, and ſix bolts in the hounds, two next the hoop at the upper part, two in the middle, and two through the lower end above the ſweep, and three or four bolts below the hounds, all to be driven through alternately, one from the ſtarboard, and the next from the larboard, ſide, and clenched on a ring; and, in ſize, from ſeven-eighths to one inch: the auger to be one-quarter leſs. The lower part of the cheeks is faſtened with dump-nails, twice as long as the cheeks are thick, and three between each hoop. The cheeks are then planed fair and ſmooth, and the lower end haunched away with a ſnape, reſembling the bill of a duck.

OAK-CHOCK.

The maſt is then canted, the fore ſide lying upwards, and the oak-chock, [*Pl.* III. *fig.* 2 & 18,] between the treſtle-trees, is to be fayed, and bolted through the maſt. The chock to be in length the width of the lower part of the maſt-head, in breadth, the depth of the treſtle-trees, in thickneſs, the ſame as the wood between

between the two holes in the lower cap, with three-eighths of an inch added for the leather, and to be bolted with two ſmall bolts, one in each oppoſite corner.

FRONT-FISH.

Next the chock is a front-fiſh, [*Pl.* II. *fig.* 12,] hollowed and fayed to the fore-ſide of the maſt; thus: The inner ſurface is firſt planed ſtrait, and the edges ſquared and hollowed to the convexity of the maſt, the ſame as the lower part of the cheeks, leaving a margin, on the inner ſurface at each edge, twice the thickneſs of the hoops, and rounded on the back to half the thickneſs on the ſides; then cant it on the maſt; the middle of the fiſh to lie ſtrait with the middle line on the maſt, and the upper end cloſe againſt the chock. Then ſquare the hoops up to the ſides of the fiſh, and with compaſſes race their thickneſs. Then cant off the fiſh, race the hoops acroſs, and take out the ſcores to their thickneſs, tar over the inſide of the fiſh, and cant it again into its place on the maſt, and nail it with nails twice its thickneſs in length.

FILLINGS

are pieces fayed to the ſide of the maſt, [*Pl* III. *fig.* 2 & 4,] the edges of the front-fiſh, and cheeks, and make a fair ſurface for the wooldings. They are ſometimes made the whole length of the front-fiſh, but often no longer than ſufficient for the breadth of the woolding, and their ends ſnaped and nailed cloſe to the maſt. They are fayed, by moulds, to the ſhape of the maſt and fiſh, and marked on the ends of the fillings at each place, and the filling trimmed thereto: the long fillings add ſecurity to the maſt, and prevent the lodgement of water.

Short fillings are remedied by ſnaping their ends, and the long fillings are fayed by moulds at the ends and middle; the middle moulds undergo a ſecond operation, being firſt fayed to the maſt, the edge of the fiſh, and the cheek, with a ſtrait back, to keep them out-of-winding, and then reverſed by another mould, to be applied in the ſame manner on the filling. The fillings, when fayed, are paid over with tar on the inſide, and nailed to the maſt,

the

then rounded on the back, to form a fair curve with the upper ſide of the fiſh, cheeks, and ſides, of the maſt. The lower end of the long filling ſnapes as the lower end of the cheeks. At the lower end of the fiſh is driven on a hoop, called a FISH-HOOP, [*Pl.* III. *fig.* 2,] which is beat cloſe to the ſides of the maſt. In ſeventy-four-gun ſhips and upwards is another hoop put on over the fiſh and fillings, called a CLASP-HOOP. [*Pl.* III. *fig.* 2, & *Pl.* I. *fig.* 10.] It has a hinge in the middle, and keys together at the ends through mortiſes, made long enough to admit two forelocks, that drive through contrarywiſe, which increaſe the tenſion of the hoop, and are nailed to the maſt

HEAD TENON.

A ſquare tenon is made at the head of the maſt for fixing on the cap: [*Pl.* III. *fig.* 2 & 9:] it is made tapering from the lower part or depth of the cap, thus: The tenon is two inches leſs than the maſt-head in large ſhips, and one inch and a half in ſmall ones, and half that is ſet on each ſide the middle line athwart-ſhips, at the upper part, and one quarter of an inch more at the lower part, and taken ſquare through and parallel to each other fore-and-aft. [*Pl.* II. *fig.* 28.] The tenon is to ſtrengthen from the aft ſide, to prevent the cap drooping below a level, by tapering the fore ſide of the maſt-head from the lower ſide of the cap to as much as the ſides are leſs than the maſt-head at the upper part, and the aft ſide of the maſt-head half as much.

HEEL-TENON.

A SQUARE TENON [*Pl.* I. *fig.* 10 & 11] is likewiſe made for fixing the heel of the maſt in the ſtep: it is two-thirds the given diameter athwartſhips, and one-half fore-and-aft at the upper part, and tapers one inch and a half in the depth (which is one-third the given diameter) in large, and three-ſevenths in ſmall, ſhips.

MASTS MADE OF TWO TREES.

Maſts, compoſed of more or leſs trees, are coaked together. Thoſe made of two trees are coaked together in the middle, [*Pl.* IV. *fig.* 11 & 34] as ſide-trees, with a coak-and-plain four feet long. The heel-piece firſt coaks on to the heel of the lower tree, and the head-piece to the upper tree, as they ſcarf under the main pieces.

MASTS MADE OF SINGLE TREES.

Maſts, made of ſingle trees, and cheeked, are rounded below the cheeks, and tapered at the upper part as made-maſts, with the ſame number of hoops on the head, but few or none on the body. The cheeks, below the hounds, are either woolded or hooped with claſp-hoops, and then finiſhed as other maſts; but oftener hooped than woolded, in the Eaſt-India or merchant ſervice.

MASTS, THAT HEAD THEMSELVES,

(that is, thoſe which have not ſeparate pieces to form their heads,) are rounded to the lower part of the hounds, and the head ſquare to the given fractions. (See Table of Dimenſions.) [*Pl.* IV. *fig.* 19] The hounds are raiſed by the bibbs, and are twice the breadth of the maſts at their upper parts, and form a bracket on the fore part to the breadth of the maſt at the lower part of hounds, they are from three to four inches thick, made of elm-plank, and a bolt, three-quarters or ſeven-eighths of an inch diameter, is driven through edgeways parallel to the upper end, to prevent their ſplitting they are then fayed to the ſides of the maſt athwartſhips at the hounds, with a coak in the middle. Their upper parts make the ſtops for the treſtle-trees, and are bolted with three bolts, ſeven-eighths of an inch diameter, and clenched on a

ring. The lower ends are rounded to a ſemi-circle, thinned with a duck's-bill ſnape, and nailed to the maſt.

The aft ſide of mizen-maſts in ſhips, and main-maſts in brigs, are coppered in the wear of the gaff and boom.

TRESTLE-TREES AND CROSS-TREES FOR LOWER-MASTS.

SAWING THE TRESTLE-TREES.

TRESTLE-TREES ARE SAWED OR HEWED to their ſizes, thus [*Pl.* V. *fig.* 32 & 33] In length, they are one-fourth the length of the top-maſt, in depth, half the given diameter of the maſt, and, in thickneſs, two-thirds of the depth. The inſides are trimmed ſtrait and out-of-winding, and the thickneſs ſet off parallel thereto. The upper ſides line ſtrait and ſquare, and the depth parallel. The under ſides are ſnaped at each end, and the edges chamfered the length of the ſnape. One end to be once and a half the depth, the other ends once the depth only, within the ends, and the ſnapes are lined to half the depth of the treſtle-tree, and rounded to a ſweep at the ends the lower outer edge is chamfered along the whole length, and the inſide only to the croſs-trees.

The longeſt ſnapes to be at the foremoſt ends of the main treſtle-trees, and the after ends of the foremaſt treſtle-trees.

SAWING THE CROSS-TREES.

CROSS-TREES ARE HEWED OR SAWED to their ſizes, thus: [*Pl.* V. *fig.* 35 & 36] In length, they are one-third the length of the topmaſt, deducting ſix inches, the breadth, as much as the treſtle-trees are thick; and, the depth, two-thirds the breadth. The upper ſides are trimmed ſtrait and out-of-winding, and the depth parallel thereto. Their inſides are lined ſtrait and ſquare from the upper ſide, and the breadth parallel to it, and are tapered at each end on the under ſides one-fourth the length of the croſs-trees,

trees, from the end to half the depth, and the ends rounded off with a ſweep, and the edges chamfered on the under ſides and round the ends the length of the ſnapes.

FRAMING OF THE TRESTLE AND CROSS TREES.

The treſtle-trees are kept aſunder, [*Pl.* II *fig.* 37,] parallel to each other, the breadth of the maſt-head athwartſhips at the ſtops, except what the treſtle-trees face on the ſide of the maſt, and ſquare with each other at the ends, and are confined in a temporary manner by pieces of ſpar, one towards each end, ſcored in between, and lapped on each treſtle-tree, and the lap nailed thereto to prevent its ſlipping.

The croſs-trees are next laid acroſs the upper ſides of the treſtle-trees at right angles, or ſquare with their lengths, and the middle of the croſs-trees kept in the centre between the treſtle-trees, the aft ſide of the foremoſt croſs-tree the depth of the maſt-head fore-and-aft, from the middle of the treſtle-trees; and the middle of the treſtle-trees kept well with the fore ſide of the maſt-head, and the fore ſide of the after croſs-tree twice the depth of the maſt-head, abaft the middle of the treſtle-trees. The breadth of the croſs-trees is then raced upon the upper ſides of the treſtle-trees by compaſſes, and ſquared down the ſides. The thickneſs of the treſtle-trees is likewiſe raced on the under ſides of the croſs-trees, and ſquared up their ſides: the croſs-trees are then removed, and ſcores cut in the treſtle-trees to let them down within one inch (or three-quarters in ſmaller ſhips) of their depth, except the facing on the outſides, which is taken in ſquare to the whole of their depth: a ſcore is likewiſe taken out of the under ſides of the croſs-trees to the breadth and depth of the facing on the treſtle-trees, but the latter is performed with more exactneſs when the treſtle-trees are got in their places on the maſt. On each ſide the ſcores in the treſtle-trees is driven a ſmall bolt, through from the upper ſide, to ſecure the ſhort wood, and clenched on a ring.

An iron plate, [*Pl.* V. *fig.* 33,] three-quarters of an inch thick, three-fourths the ſquare hole long, and two-fifths the thickneſs of the treſtle-tree broad, is let in on each ſide, to keep the fid from rubbing the treſtle-tree.

The treſtle-trees are next got into their places, and face on the athwartſhip ſides of the maſt as follow. Firſt, the head of the maſt muſt be elevated, by barrel or other ſcrews, more than half the length of the treſtle-trees, or elſe got over a hole or cellar, as are in ſome maſt-houſes, conveniently fitted with ſcuttles, or launched an-end over a wharf, and a ſtage made under the head. The maſt ſhould be fixed perpendicularly to its diameter, and the treſtle-trees got up into their places with a tackle, and fixed by ſhores on the athwartſhip ſides of the maſt. Their lower ſides reſt upon the ſtops, their middle is kept well with the fore ſide of the maſt, and their inſides perpendicular and parallel. The foremoſt ends are to drop as much below a ſquare with the middle line on the maſt as the maſt is deſigned to rake aft in the length, that they may be level when the maſt is in its place. In this poſition they are made to bed firm on the ſtops, being ſquare athwart from the middle line. One inch and an eighth of the treſtle-trees to be let into the maſt, and marked with compaſſes on the upper ſide of the chock, and lower ſide of the maſt from their inſides, and from the ſides of the maſt on the upper ſides of the treſtle-trees. Then race by the upper ſide of the chock and under ſide of the maſt upon the inſides of the treſtle-trees and the upper ſides of the maſt The treſtle-trees are then lowered down, and one inch ſet down from the upper ſide of the maſt at the middle of the chock on each ſide, [as ſhewn in *Pl.* III. *fig.* 18,] and one inch and a half at the upper ſide of the treſtle-trees, and that wood taken away to the race upon the upper and fore ſide of the chock then ſet up one inch and a half from the under ſide of the maſt at the ſtop, and one inch at the upper ſide of the treſtle-tree, ſtrike a line, and cut away the wood ſquare to the race underneath. The ſame is ſet off on the inſides of the treſtle-trees, and the intermediate wood cut away to the depth of the race on the upper ſide, ſo that what it is faced in on the maſt remains on the treſtle-trees

The treſtle-trees are then ſet cloſe, and bolted to the maſt-head, with three bolts, one inch to one inch and a quarter diameter; one through the under ſide next the ſtop, one through the upper ſide next the upper ſide of the treſtle-tree, and one through the middle of the chock: the holes to be bored through three times their diameter

ameter from the edge. The bolts in the treſtle-trees are driven from contrary ſides, and are clenched on a ring. It is beſt not to bolt the treſtle-trees but when the maſt is for preſent uſe

The croſs-trees are now faced on to the treſtle-trees, as before-deſcribed.

BIBBS FOR LOWER-MASTS.

Bibbs are brackets, [*Pl* II. *fig* 23,] made of elm-plank, from three to five inches thick, nine-elevenths the length of the hounds in length, and, in breadth, ſix-fifteenths their length. The after edge is firſt lined ſtrait, and the upper part ſquare from that, and the fore part tapered by a moulding to four or ſix inches broad at the lower ends. The after edge is fayed on the cheeks, and the upper part againſt the under ſide of the treſtle-trees on the fore ſide of the maſt viz In the middle of the after edge, ſet up one inch and a half, and line ſtrait from that to nothing at the lower end, which makes a butt in the middle then place the bibbs on the maſt, their thickneſs within the ſides of the cheeks, and their upper parts to the outſide of the treſtle-trees then let one inch and a half be raced by the lower edge of the bibbs upon the cheeks, and the wood taken out to that depth, and the thickneſs of the bibbs, that they may bed firm therein they are then bolted edgeways through the cheeks with four bolts driven from the fore ſide, and clenched on a ring on the aft ſide The bolts to be in diameter from one inch to ſeven-eighths or three-quarters in ſmall ſhips maſts, and only three in number. The lower end of the bibb is rounded off to the ſurface of the cheek, and the edges chamfered.

The maſts of Eaſt-India ſhips are fitted with double bibbs under their treſtle-trees, [as *Pl* II *fig.* 51] They are then let on as others are, and ſecured by an iron ſtrap.

BOLSTERS FOR LOWER-MASTS.

BOLSTERS [*Pl.* II. *fig.* 26, & *Pl.* V. *fig.* 32 & 33] are pieces of fir fayed upon the upper ſide of the treſtle-trees, and againſt the 'thwartſhip ſides of the maſt-head. They muſt be ſufficiently long to clear the fid-hole and after croſs-tree, and broad enough to project one inch and a half, or more, without the treſtle-trees, and the ſame in depth, and rounded from the upper to the lower edge on the outſide, and nailed to the treſtle-tree at each end. They are to prevent the ſhrouds chafing by the motion of the maſts.

CAPS FOR LOWER-MASTS.

CAPS are next ſawed and trimmed and firmly fixed on the maſt-head thus The main and fore maſt caps of large ſhips are of elm, and made of two pieces, coaked or douled together in the middle, and others are of one ſolid piece.

MAIN-CAP, in length, to be four times the diameter of the top-maſt, adding three inches. The breadth to be twice the diameter and two inches added, and the depth four-ninths the breadth. [*Pl.* II. *fig.* 27, & *Pl.* V. *fig.* 25, 26, 27, 28, & 29.]

FORE-CAP, in length, to be four times the diameter of its top-maſt, adding two inches. The breadth to be twice the diameter, adding one inch, and the depth four-ninths the breadth.

MIZEN-CAP, in length, to be four times the diameter of its top-maſt, adding one inch. The breadth to be twice the diameter, and the depth four-ninths the breadth.

The CAPS of YACHTS and ſimilar veſſels have a ſheave-hole on each ſide for the jeers of the lower-yards

CAPS are TRIMMED or SAWED to their dimenſions, and their upper and under ſides made ſtrait and out-of-winding, and the ends

and

and ſides made ſquare. If the cap is made of two pieces, to one piece is added the thickneſs of the coak. The coak is raiſed from this half, about one inch and a quarter on the middle ſurface, extending the whole length, and is broader on the ſurface than at bottom, reſembling the tail of a dove, and is termed a dovetail. The bottom is one-third the thickneſs of the cap, placed exactly in the middle, and three-eighths of an inch wider on the ſurface on each ſide of the middle line: the thickneſs of the coaks is lined down on each ſide parallel with the ſurface, and ſquared acroſs at each end: the wood is then taken away on each ſide to form the coak. A coak is then ſunk in the other half to fit the former, and driven together by malls, or by a carling ſlung. The two pieces are then bolted through with ſix bolts, one inch diameter, two at each end and two in the middle, which are driven from each ſide alternately and clenched on a ring.

The holes are ſet off from the centre of the under ſide of the cap at equal diſtances; the ſubſtance left between the holes to be two-fifths the diameter of the round hole, and half the tapering of the maſt-head in its length. The round hole is the foremoſt one, and is ſwept round with compaſſes three-quarters of an inch larger than the diameter of its topmaſt, (to allow for leathering,) and is ſquare from the under ſide to the cap's length and breadth, and parallel to its thickneſs. The ſquare hole is ſet off a little leſs than the lower part of the tenon on the maſt-head, and tapered from a ſquare to the ſize of the upper part of the tenon upon the upper ſide of the cap, to fix on tight. The boundaries of the holes are notched, and a hole bored through with an auger, at the oppoſite corners of a ſquare hole, and one only in the ſide of the round hole, to ſaw them out to their ſizes. Four large eye-bolts are then driven through the cap from the under ſide, one inch and ſeven-eighths to one inch and three-quarters in diameter, for hooking the top-block, &c. and, as the weight of the topmaſt and yards depends thereon, the iron ſhould be the beſt, and the eyes free from flaws. One of the bolts is placed on each ſide of the ſquare hole near the edge of the cap on the under ſide, and one on each ſide of the round hole, at the fore part, perpendicular or

ſquare

ſquare to the length and breadth. Theſe bolts are well clenched upon an iron plate let into the upper ſide of the cap.

Caps douled together in the middle have three ſquare mortiſes ſunk in the joining ſurfaces of each piece, one in the middle and one in each end lengthways, of equal ſizes, and placed in the middle of the cap's thickneſs, about four inches ſquare and four inches deep. Oak tenons are then fitted tight into theſe mortiſes, to fix into mortiſes of the other piece, and bolted ſimilar to the former.

The round holes of all caps are leathered and nailed on the upper and lower ſides.

In letting on caps, to allow for their ſhrinking, the ſize of the tenon is taken one inch and a half above the ſtops, and that ſet off on the under ſide of the cap. The ſame attention is paid in cutting out the mortiſe in the ſteps, for the tenons at the heel The caps are alſo to be raiſed above a level from the middle line on the maſt one-quarter of an inch to a foot in length, to allow for their drooping.

Laſtly. On the edges of the maſt-head are fayed BATTENS, let in over the hoops and faſtened, and the edges are rounded, for the rigging to ſlide down eaſy.

CUTTERS MASTS

are oftentimes left eight-ſquare four or five feet above the deck, and from thence rounded to the hounds, as other maſts, and fitted with bolſters or croſs-trees like a top-maſt. When they have croſs-trees, the heads are ſquare, and fitted with a cap, ſimilar to ſhips top-maſts. Bolſters are only faſtened to the maſt when the maſt and top-maſt are made in one, and the top-maſt above the ſtops rounded, and the head above the hounds left ſquare. An iron hoop is driven on the ſtop of the topmaſt-hounds, with a ring at the fore part, and another hoop let on its breadth at the upper

upper part of the head, with a round ring on the fore part, through which ſlides the topgallant-maſt, and is retained at the heel by a bolt through the lower ring. A ſheave-hole is cut fore-and-aft through the topmaſt-hounds, and commonly four large eye-bolts with ſhoulders are driven from the aft ſide through the maſt-head, upon iron plates let in the maſt, and clenched upon plates let in the fore ſide The bolts are one inch and a quarter to one inch and a half diameter the lower one is driven through the middle of the lower hounds, the ſhoulder downwards the other three are equally ſpaced between the ſtop of the lower hounds and the lower part of the topmaſt-hounds: the two lower ones are driven with the ſhoulder on the larboard, and the upper on the ſtarboard, ſide. The after ſide of the maſt to be coppered in the wear of the gaff and boom.

SLOOPS, SMACKS, HOYS, AND BOATS, MASTS,

from a middle line, are trimmed thus The height of the partners is two-thirds the diameter, taking feet for inches, ſet up from the butt or heel, and there ſet off the given diameter as before. In the middle between the partners and the ſtop of the ſhrouds, thirty thirty-one parts of the given diameter, at the under part of the hounds, ſeven-eighths, at the upper part, ſeven-tenths, and to have ſtops of one inch and a half, or two inches, on each ſide athwartſhips in proportion to the ſize of the maſt Top-maſt, in the middle between the ſtops, two-thirds of the given diameter, at the upper part, three-fifths, and, the ſquare head above the top-maſt, three-ſevenths, and completed as the former

BOATS MASTS, not ſloop-faſhion, are trimmed round from heel to head thus Strike a ſtrait line along the middle, and ſet up the partners from the heel, which is the depth of the boat, and there ſet off the given diameter, then ſet up the whole length, and line it to two-thirds the diameter of the partners, with a ſheave-hole its length clear of the ſtop for the haliards.

TOPMASTS,

MAIN AND FORE, after being ſawed or hewed, are completed thus. The block below the heel is left eight-ſquare, [*Pl.* V *fig.* 2,] and a hoop, two inches leſs in diameter, is driven on the lower end. The heeling is to be ſquare, and the edges chamfered, and, if not ſufficient to fill the hole in the treſtle-trees, fillings are fayed and nailed thereto, to make good ſuch deficiency. From the lower cap it is trimmed ſixteen-ſquare, and rounded to the under part of the hounds, which are nearly eight-ſquared, to admit them through the round hole in the lower cap.

Sometimes ſhips in the Eaſt Indies, &c. have hound-pieces made of elm, teak, or harder wood than fir, fayed to their top-maſt-heads, and faſtened as bibbs on lower-maſts that head themſelves.

The head is left ſquare above the ſtops, and the edges chamfered between the upper ſide of the croſs-trees and under ſide of the cap. The whole top-maſt is then planed fair and ſmooth, and a ſheave-hole cut through the block, in the middle of the after ſquare of the larboard ſide to the foremoſt ſquare on the ſtarboard ſide. The length the ſame as the depth. The breadth two inches for every foot in length, and ſo in proportion for all ſheave-holes. A groove [*Pl.* V. *fig.* 1] is made on each angle of the heeling in the direction of the lower ſheave-hole, large enough to contain the top-rope, when paſſing through the ſquare hole in the treſtle-trees.

In the middle of the heeling, a ſquare hole is cut through athwartſhips for the fid: its lower part to be the depth of the treſtle-trees above the block. [*Pl.* V. *fig.* 1.] Iron fids are once and a half the given diameter of their lower-maſt in length, [*Pl.* V. *fig.* 13,] one-third the given diameter of their top-maſt in depth, and two-thirds their depth in thickneſs. Wooden fids differ from the former in depth, being made one-half the diameter of the top-maſt. Fids are made ſquare, to the given dimenſions,

and

and one end rounded, the other ſnaped from the under ſide, and a hole for a lanıard ın both ends.

The upper ſheave-hole for the top-rope to be four ınches above the heeling, [*Pl.* V. *fig.* 1,] cut through tranſverſely to the lower one, by boring four or more holes through with an auger the breadth of the ſheave-hole, and then cleared ſtrait through with chiſſels: all other ſheave-holes ın the ſame manner.

Eighteen-gun ſloops, and veſſels under that ſize, ın the royal navy, and moſt ſhips in the merchant-ſervice, have a ſheave-hole for the topſail-tye cut through the middle of the hounds fore-and-aft, [as *Pl.* V. *fig.* 13,] but, as it weakens the maſt, ıt ıs better avoided.

TOP-MAST TRESTLE AND CROSS TREES

are differently fitted from the lower ones. [*Pl* V. *fig.* 37, 38, 39, 40, 41, & 42.] The length of the treſtle-trees is three ınches and a half to every yard their top-maſts are in length, and each croſs-tree one-third longer than the treſtle-trees. Depth of the treſtle-trees, one ınch and an eighth to every foot in the length. Breadth, two-thirds the depth. Depth of the croſs-trees, ſeven-eighths of the depth of the treſtle-trees. Breadth, one-fourth more than the breadth of the treſtle-trees. The treſtle-trees are trimmed ſimilar to the lower ones, and a ſheave-hole cut through the foremoſt end of each main-topmaſt treſtle-tree, not exactly fore-and-aft, but at angles with the length the foremoſt ends to be without the middle of the treſtle-tree, to lead fair with the fore topgallant-braces. there are to be, likewiſe, two ſheave-holes in the after ends of the fore-topmaſt treſtle-trees. The croſs-trees are trimmed (moſtly ſawed) ſtrait on their upper ſides, but mould ſtrait only one-third the length ın the middle, and round aft from thence on each ſide with a curve one-third the diameter of the topmaſt, and one-half their breadth · they hold a parallel depth in the middle three-ſevenths the length, and taper from thence to half the depth at the ends, which are rounded, and a hole bored four inches within for the topgallant-ſhrouds.

The CROSS-TREES are let into the treſtle-trees, with ſcores, as the lower ones, to half the depth of the croſs-tree, and face on

half an inch. The middle of the treſtle-trees is kept well with the topmaſt-head at the fore ſide, and the middle croſs-tree let in between that and the topgallantmaſt-heel, the fore ſide of the after croſs-tree to the exact ſize of the topmaſt-head, and the aft ſide of the foremoſt croſs-tree about one inch leſs in the clear, and both faſtened to the treſtle-trees with bolts ſeven-eighths to five-eighths of an inch diameter, driven through the middle from the upper ſide with a ſaucer-head, and ſecured underneath with a forelock turned upon a ring. They are then got over the topmaſt-head, and fixed firm on the ſtop of the hounds. Bolſters [*Pl.* V. *fig.* 39] are fayed upon the treſtle-trees on each ſide of the maſt-head, like the lower ones.

TOPMAST-CAPS.

The CAP [*Pl.* V. *fig.* 30] is trimmed and fitted as the lower cap, and differs little but in ſize, except in the eye-bolts, which are driven the ſame diſtance on each ſide the round hole, and are, in diameter, one inch and an eighth to ſeven-eighths of an inch. the other bolts in proportion. Length, four times the given diameter of the topgallant-maſt, and one inch added, breadth, twice that diameter, and depth, ſeven-fifteenths the breadth.

Cloſe up under the cap on each ſide athwartſhips are CHEEK-BLOCKS, [*Pl.* V. *fig.* 1 & 2,] tenoned into the topmaſt-head. The length, twice and a half the depth of the head, and ſix inches added for the three tenons. Half the depth of the head in thickneſs, and ſeven-eighths the depth in breadth, made of elm, and the whole thickneſs divided to make the tenons, ſheave-holes, and back · viz. The depth of the tenons and the thickneſs of the back are each three-eighths of the whole thickneſs, and the remainder for the ſheave-hole. The tenons to be two inches ſquare, one in the middle, and one at each end; and the ſheave-holes the thickneſs of the rope longer than the breadth. The back of the block is divided into three parts, and one-third on each ſide bearded down to one-third the thickneſs of the back at each edge

They are then let into the topmaſt-head with mortiſes, and holes are bored through the centre of the ſheave-holes, that the ſheaves may work on the bolts which faſten them to the maſt-head.

head. The bolts are ſaucer-headed, and forelocked on a ring. The blocks are not faſtened until the topmaſt is in its place through the hole of the lower cap.

The ſheave-holes are coppered, to prevent the blocks chafing with the rope. Moſt ſheave-holes in yards, &c. are the ſame, or ſometimes guarded on the edges by a thick wire driven into the ſolid.

MIZEN-TOPMASTS

are trimmed [*Pl.* V. *fig.* 13] as main and fore topmaſts in proportion, but differ thus viz. They have no block below the heel, only a ſquare heeling at the butt, and a ſheave-hole cut fore-and-aft through the hounds, one-third its length below the ſtops, for the topſail-tye, in all ſhips.

If a long pole-head, it is rounded above the ſtops, and a ſheave-hole cut through, fore-and-aft, once and a half its length above the ſtops, for the ſtayſail-halliards, and another ſheave-hole, half its length below the head, for the mizen topgallant-tye. Laſtly, a ſquare tenon is made on the upper part, as large as the head will admit, for the truck, which has a mortiſe the ſize of the tenon cut out in the middle, and driven on tight to its thickneſs.

TOPGALLANT-MASTS

trim as the mizen-topmaſt [*Pl* V *fig.* 14, 15, & 24] with a pole-head, except when royal-maſts are uſed, and then like a mizen-topmaſt with a ſquare head.

ROYAL-MASTS

are trimmed ſimilar to topgallant-maſts or flagſtaffs.

TRYSAIL-MASTS

ſtep upon deck cloſe abaft the main-maſt of ſnows, and their heads fix underneath the aft ſide of the top. At the head they are trimmed round to three-fourths the diameter at the heel.

BOWSPRITS.

BOWSPRITS, MADE OF TWO TREES,

are coaked together in the middle, [*Pl.* I. *fig.* 27, *&* *Pl.* III. *fig.* 27,] bolted as maſts, and lined to the ſize the fore-and-aft way from a middle line on the athwartſhip ſide, and hewed plumb then canted up, and a middle line ſtruck along the upper ſide, and the eight-ſquare ſet off. The ſame on the oppoſite ſide, and trimmed as the maſt: then canted down, and the fiſhes coaked on to the athwartſhip ſides, faſtened and lined to the bigneſs athwartſhips then eight-ſquared, ſixteen-ſquared, and rounded, except the ſquare at the outer end, which haunches from thence into the round. Then ſtation the hoops, thus: Five to be in the lower drift of a firſt-rate ſhip, and four in a ſecond and third, from the heel to the bed, and nine in the upper drift of the firſt rate, and eight in the ſecond and third, from the bed to the ſquare at the outer end, and two mould-hoops on the ſquares of each rate. The hoops are then driven on to their ſtations as before. Place the hoops clear of the tenon at the heel, the bed, the gammoning, and tenon at the outer end.

BOWSPRITS, MADE OF SINGLE TREES,

are ſixteen-ſquared, [*Pl* IV. *fig.* 27,] and rounded to the ſquare at the outer end as before. Thoſe left ſquare within the bow are ſixteen-ſquared, and rounded from thence to the outer end, and planed ſmooth and fair The former have two or three hoops driven on the heel; the latter only one, let into the heel.

THE BOWSPRIT-CAP

is next trimmed, [*Pl.* V. *fig.* 31,] and let on the outer end with a tenon. The length of the cap is five times the diameter of the jib-boom, the breadth, twice the diameter of the jib-boom, and half the diameter of the jack-ſtaff, and, the thickneſs, four-ninths the breadth.

Set

Set off what the bowſprit ſtives in the thickneſs of the cap before the length.

The fore-and-aft ſides of the cap are trimmed or ſawed ſtrait and out-of-winding, and are of a parallel thickneſs. The athwartſhip ſides are cut ſquare and parallel to the breadth. The ends are cut ſquare athwart and fore-and-aft to the ſtive of the bowſprit. Then a line is ſtruck lengthways on the fore-and-aft ſide of the cap near the middle, leaving half the diameter of the jack-ſtaff on the ſtarboard-ſide. Then ſet off, parallel from the upper part of the cap, once its thickneſs, for the upper ſide of the hole that the jib-boom ſlides through. Then ſet off the diameter of the jib-boom on each ſide ſquare from the upper ſide of the hole and parallel, and race it acroſs on the fore-and-after ſides. Then ſet off half the diameter of the jib-boom on each ſide of the middle line on the cap, and ſweep the hole to an oval In ſetting off the hole, three-quarters of an inch is to be added for leathering.

From the under part of this hole, ſet down two-ſevenths the diameter of the bowſprit, and ſquare it acroſs for the upper part of the hole, which fits the tenon made on the outer end of the bowſprit, thus Three-fourths the diameter is ſet off from the middle line athwartſhips, and ſeven-eighths fore-and-aft from the upper ſide at the thickneſs of the cap within the end, and half the remaining bigneſs of the bowſprit is ſet down from the upper ſide at the outer end, and tapers half an inch in the length each way.

Six bolts, one-inch and an eighth to ſeven-eighths of an inch diameter, are driven through the cap from the athwartſhip ſides, and parallel to the breadth · the four upper ones to be eye-bolts, and the two lower ones ſtrait The upper eye-bolt to be driven in the after-hole from the ſtarboard-ſide, and the others from each ſide alternately, and clenched on a ring Another eye-bolt is driven through the middle of the cap, from the aft ſide, between the round hole and the upper part the eye to ſtand up and down. Another eye-bolt is driven from the fore-ſide at the lower edge, after the cap is fixed on the bowſprit, and belays with a forelock in the middle of the ſquare part on the aft ſide, and a ſtrait bolt

is

is driven athwartſhips, in the middle of the ſquare hole parallel to the aft ſide, through the tenon, and clenches on a ring. A groove is made, for the jack-ſtaff, from the upper ſide of the cap to the middle of the ſquare hole on the ſtarboard-ſide the groove to be the diameter of the ſtaff in breadth, and half in depth. The ſtaff is confined, near the upper part of the groove, by an iron ſtrap, made with a ſemi-circle in the middle, to embrace the ſtaff, and a hole in one end for a ſtaple, and a mortiſe in the other, that goes over a toggle-bolt, and is there retained by an iron pin. The heel of the ſtaff reſts in a hole made in the ſtarboard-lee.

BEES OF THE BOWSPRIT

are made of elm-plank. [*Pl.* III. *fig.* 27.] The length, twice and a quarter the given diameter of the bowſprit, the breadth, two-thirds the diameter, and the thickneſs, one-fourth the outer diameter of the bowſprit at the inner edge, and tapering from thence to four-fifths that thickneſs at the outer edge, on the under ſide. The outer ends are left ſquare, the projection of the cap and the inner ends, one-third the breadth, and then turned off with a hollow and round. About one-fourth within the ends are bored holes, large enough to reeve the fore top-maſt and preventer ſtays. The hole at the outer end of the ſtarboard-bee is made long enough to anſwer with the ſheave-hole in the block underneath, and with the hole at the inner end of the larboard-bee. The other holes are uſed when wanted Seamen ſay the ſtays would lead clearer, if the ſheave-holes in the bee-blocks were at the contrary ends. In the outer end of the ſtarboard-bee is cut a ſemi-circle, to anſwer the groove in the cap, for the heel of the jack-ſtaff.

The bees are let into the outer ends of the bowſprit one-third their thickneſs, and one on each ſide their foremoſt ends are fayed cloſe againſt the aft ſides of the cap, the upper ſides well with the upper ſide of the bowſprit, and their outer edges raiſed above a level, three inches in every foot in the breadth, then bolted through the head of the bowſprit with four bolts, one inch diameter, in large ſhips, and with three bolts, ſeven-eighths of an inch diameter,

ter, in ſmaller ſhips. The holes are bored parallel to the upper ſide in the middle of the outer edge, and the bolts clenched on a ring on the oppoſite ſides of the bowſprit, one at each end, clear of the holes. The others bolt in the middle between the holes.

BEE-BLOCKS

are of elm, [*Pl.* IV. *fig.* 27,] ſeven-ninths the length of the bee; the depth, two inches for every foot in the length, and the thickneſs, ſeven-eighths of the depth. They are fitted with a ſheave in the foremoſt end of one and after end of the other. The ſheave-hole, two-ſevenths the length of the block, and half the length within the end, and one-fourth the length in breadth. In the other end of the block is cut a ſquare mortiſe, under the other hole in the bee The blocks are fayed to the ſides of the bowſprit and under ſide of the bees, and bolted with two bolts, one through each ſheave-hole, and belay on a ring with a forelock. The bolts ſerve as an axis for the ſheaves.

THE TENON AT THE HEEL

is ſimilar [*Pl.* IV *fig.* 27 & 28] to that at the head, [*Pl.* IV. *fig.* 27 & 33,] and is ſeven-twelfths the given diameter athwartſhips, and two-thirds up and down, and tapers one inch in the length, which is one-third the given diameter.

THE SADDLE FOR THE JIB-BOOM

is one-ſixth the given diameter in thickneſs, [*Pl.* III. *fig.* 27,] and one-half in length, fayed upon the bowſprit, at one-third of the boom within the outer end A ſeat is made upon the upper part for the heel of the boom to lie on, clear of the ſaddle for the ſpritſail-ſlings, and is nailed to the bowſprit after the bowſprit and and jib-boom are rigged.

THE SADDLE FOR THE SPRITSAIL-SLINGS

is one-eighth of the given diameter in thickneſs. [*Pl.* III. *fig.* 27.] It fays upon the bowſprit before the boom-ſaddle, and is made of a parallel breadth to its thickneſs, is chamfered on the aft ſide at the upper part, and nails upon the bowſprit about one-

fifth the length within the outer end, and leaded on the fore ſide one-half the circumference of the bowſprit upon the ſame.

THE SADDLE FOR THE RUNNING-RIGGING

is ſimilar to the above, [*Pl.* III. *fig* 27,] and nails on the bowſprit juſt without the gammoning, but not till the bowſprit is rigged. It has ſeveral holes bored through fore-and-aft, through which the rigging is led clear into the bow.

CLEATS

are made for ſtops againſt the collars and gammoning, [*Pl.* III. *fig.* 27,] and are nailed on when rigging. The cleats againſt the collars to be in length one-half the given diameter; and one-fourth the length thick and broad. The cleats againſt the gammoning to be two inches ſhorter than the collar-cleats, and the ſame in proportion. The ends are cut bevelling to the direction of the rope.

LASTLY, A WOOLDING,

the ſame as on the maſt, [*Pl.* III. *fig.* 27,] is fixed juſt within the ſquare at the outer end.

The bowſprits of ſmall veſſels, as cutters, &c. commonly have an iron hoop let on, which nails to the outer end, with an eye on each ſide and one in the middle, on the upper ſide, and a ſheave-hole cut through the inner and outer ends.

YARDS.

YARDS.

YARDS THAT SCARF TOGETHER IN THE MIDDLE.

After yards are ſawed as directed, they are completed thus: Thoſe that ſcarf together in the middle [*Pl.* II. *fig.* 39 & 40] have the ſcarf and haunches trimmed ſtrait and out-of-winding on the inſide; a line is ſtruck along the middle, and a chain-coak ſet off, two feet four or two feet ſix inches long, one-third of the diameter broad, and the butts ſquared acroſs and down the ſides. The coaks are raiſed one inch and a quarter at the butt, and ſunk to the ſame on the other ſide of the middle towards the arm: the other half is then canted thereon, ſet ſtrait and out-of-winding, fayed as the maſts, and bolted together fore-and-aft through the middle in the butt of every coak. The heads are driven from the thinneſt part of the ſcarf and clenched on a ring; and the haunches are nailed.

The yard is then ſixteen-ſquared, and rounded from one quarter on each ſide the ſlings to the outer ends, except on the aft ſide, which muſt remain ſquare two quarters on each ſide the middle. The whole is then planed fair and ſmooth, and the ſcarfs caulked their length. It is then hooped, one hoop over the butt of each ſcarf, one in the middle of each haunch, and one between every bolt. Then a fiſh of fir, two inches thick, and the ſame length and breadth as the ſquare on the aft ſide, is fayed and nailed cloſe over all the hoops.

NEW METHOD OF MAKING YARDS OF TWO TREES. Two trees of the ſize wanted are ſcarfed together, holding their diameters beyond the fiſhes. The deficiency of the diameter is made good by long fiſhes of fir, from four to ſix inches thick, as the ſize of the yard may require, extending two feet in length, at each end, beyond the long ſquare on the aft ſide, and each of ſufficient breadth to form the eight-ſquare on the outſide. The inner ſurfaces of the fiſhes are coaked and fayed cloſe upon the yards, the coaks extending near the whole length. They are trimmed eight-ſquare, one quarter each way beyond the middle,

the remainder is rounded, except the aft ſide, which is left ſquare two quarters each way, then rounded, and the ends ſnaped. Bolts are driven from the fore-and-aft ſides alternately, between the hoops, which are ſtationed as uſual.

The yard would be ſtronger were the fiſhes not coaked for ſome diſtance from the middle, it having a tendency to weaken the ſcarfs of the main pieces.

YARDS LENGTHENED AT THE QUARTERS

have their ſcarfs trimmed ſtrait and out-of-winding. [*Pl.* II. *fig.* 50] The ſcarf on the arm-piece is to fit the tongue on the yard, then to be driven on, ſet cloſe, and bolted with three bolts, five-eighths to three-quarters of an inch diameter, and the ends of the ſcarf nailed. The yard is then rounded and planed ſmooth; and five hoops driven over the ſcarf, one over each butt, and three equally between.

YARDS MADE OF SINGLE TREES.

MAIN AND FORE YARDS, made of ſingle trees, [*Pl.* V. *fig.* 44,] are ſixteen-ſquared, and rounded as the former. In merchant-ſhips, they have ſheave-holes in their arms for the top-ſail-ſheets, and are left ſquare the length of the ſheave-hole. But this method weakens the yard, and ſhould not be adopted. Obſerve, ſhould the tree be crooked, to place the rounding ſide uppermoſt.

TOPSAIL-YARDS, [*Pl.* V. *fig.* 62 & 74,] being trimmed ſix-teen-ſquare, are rounded and planed ſmooth and fair from the firſt quarter on each ſide the middle to their outer ends, and a ſheave-hole cut from the upper ſide its length within each outer end for the reef-tackles. In ſome merchant-ſhips, holes are cut within the cleats for the topgallant-ſheets, but it is better avoided, as it weakens the yard-arms.

TOPGALLANT-YARDS, [*Pl.* V. *fig.* 75,] ROYAL-YARDS, [*Pl.* V. *fig.* 79,] CROSS-JACK-YARDS, [*Pl.* V. *fig.* 61,] MIZEN-YARDS, [*Pl.* V. *fig.* 60,] SPRIT and SPRIT-TOP SAIL-YARDS, [*Pl.* V. *fig.* 76 & 77,] STUDDING-SAIL [*Pl.* V. *fig.* 58 & 78] and DRIVER YARDS, (which are ſimilar to lower ſtud-

ding-

ding-ſail-yards,) are trimmed eight-ſquare, ſixteen-ſquare, and then rounded and planed fair and ſmooth from end to end throughout the length.

BATTENING OF YARDS.

BATTENING OF YARDS. [*Pl.* V. *fig.* 44, 62, & 74] Main and fore yards, main, fore, and mizen, topſail-yards, have oak battens nailed on their ſquares, nearly the ſame length and breadth, and one inch to three-quarters of an inch thick; their ends rounded and ſnaped with a duck's bill, and the edges chamfered. The fore ſides have no battens.

CLEATING OF YARDS

THE SLING-CLEATS, [*Pl.* V *fig.* 44,] nailed on the fore ſide of main and foie yards, are once and a quarter the diameter of the yard in length, with a ſhoulder one-third its length. The breadth one-fourth the length. The thickneſs two-thirds the breadth, and nailed at once the diameter on each ſide the ſlings. They are made of elm.

STOP-CLEATS [*Pl.* V. *fig.* 44] nail within the arms, on the foie and after ſides, at one inch and a half to every yard in the length They are in length half the diameter of the yard, in breadth, one-fourth the length, in thickneſs, two-thirds the breadth. Merchants yards have their cleats ſometimes raiſed from the ſolid · ſome are made of oak, others of elm.

Topſail-yards have ſtop-cleats nailed on the fore ſide of the yard, [*Pl.* V *fig.* 62,] at once the diameter on each ſide of the ſlings. Thoſe within the arms, on the fore and after ſides of the main and foie topſail-yards, are at three inches to every yard in the length, and mizen-topſail-yards at two inches and a quarter within their outer ends or arms.

Topgallant-yards, the ſame as topſail-yards. [*Pl.* V. *fig.* 75.]

Royal-yard-cleats [*Pl.* V. *fig.* 79] are once the diameter on each ſide the middle aſunder, and at twice their length within the arms.

Croſs-jack-yards have ſtop-cleats [*Pl.* V. *fig* 61] nailed on the fore ſide of the yard at half the diameter on each ſide of the ſlings.

ſlings. Thoſe at the arms are at one inch and a half within their outer ends to every yard in length, and nailed on the fore and after ſides.

Mizen-yards have ſtop-cleats [*Pl.* V. *fig.* 60] nailed once the diameter aſunder on the ſtarboard-ſide, and once and a half the diameter below the middle of the yard. Thoſe at the peek, or outer end, at once the diameter within.

Sprit and ſprit-top ſail-yards have ſtop-cleats [*Pl.* V. *fig.* 76 & 77] nailed on their under ſides: the ſprit-ſail-yard at once the diameter on each ſide the ſlings, the ſprit-topſail-yard at half the diameter on each ſide. Thoſe at the arms, one inch and a half within their outer ends to every yard in the length; and they nail on the fore and after ſides, contrary to thoſe at the ſlings.

Studding-ſail and driver yards have ſtop-cleats, [*Pl.* V. *fig.* 58 & 78,] nailed once the diameter aſunder, at one-third the length of the yard from the inner end. Thoſe at the arms twice their length within.

Boats-yards' cleats, once the diameter aſunder at the ſlings; ſome in the middle, others at one-third from the end, ſuch as lugs, lateen, and ſettees, and the length of the cleat within at the arms.

FINISHING OF YARDS.

Yards are fitted at their outer ends for rigging out ſtudding-ſails. Main and fore yards have four BOOM-IRONS; [*Pl.* V. *fig.* 44;] one on each of the outer ends, the others at one-third the length of the boom within. The OUTER BOOM-IRON [*Pl.* V. *fig.* 46] is compoſed of a ring, a neck, and ſtraps.

The ring, through which the boom ſlides, is the ſame diameter in the clear as its topmaſt ſtudding-ſail-boom, the breadth, three-eighths the diameter, and five-eighths to three-quarters of an inch thick. In one ſide a lignum vitæ roller is fitted, one-third in length the diameter of the boom-ring.

The neck is ſquare, and connects the ring to the ſtraps, each one inch longer than the diameter of the ring, and one-fourth its length in ſize.

The

The ſtraps are made one inch and a quarter in length to every three feet of the yard. The breadth, once and a half the breadth of the ring. Thickneſs, at the inner part, three-eighths of an inch. They increaſe in ſubſtance towards the neck, and are made to the ſhape of, and let their thickneſs into, the yard-arm. Two holes are punched through the ſtraps for bolts, the ends made round, and holes punched. Two hoops are made the ſize of the yard-arm, one cloſe to the end, the other nearer the neck.

INNER BOOM-IRONS [*Pl.* V. *fig* 48] are made after the ſame proportion as the outer ones, but differ in ſhape. The ſtraps are made to compaſs the yard at one-third the length of the topmaſt ſtudding-ſail-boom, within the end, and the ring is ſeparated from the ſtraps by a collar: the upper part of the ring opens with a hinge on one ſide, and the heel of the boom is laid therein, and confined by a bolt paſſing through eyes oppoſite the hinge, which is retained by a ſpring-forelock through the point.

Boom-irons fix on the yards thus: [*Pl.* V. *fig.* 44:] The rings are parallel with the axis of the yard, in a ſtrait direction with a line ſtruck upon the yard, in the middle of the ſquare, between the upper and fore ſide. The outer boom-irons let in their thickneſs at each outer end of the yard, and are bolted through, clenched, and nailed: the two hoops are driven on tight, and ſtopt with a nail on each ſide. The inner boom-irons have their ſtraps made hot, and encircled the yard at one-third the length of the topmaſt ſtudding-ſail-boom: they are nailed through holes in the ſtraps, and oakum twiſted round their heads to prevent their flying off.

Boom-irons on the yard-arms of ſhips in the merchant-ſervice differ much in ſhape. [*Pl.* V. *fig.* 56] The ring the boom ſlides through is connected by a collar to a ſquare hoop, that lets on, and nails to the yard-arms, they being left ſquare, and ſometimes a round hoop to the ſize of the yard-arm. Others have a ſtrait neck, projecting from ſtraps, with a ſhoulder in the middle of the neck, and the part without left ſquare. The boom-ring has a ſhank on the under part, with a mortiſe that fits the neck,

neck, and is there faſtened by a ſcrew-nut or a ſpring-forelock that goes on the neck next the ring.

Topſail-yards, main and fore, [*Pl.* V. *fig.* 62, 64, & 66,] commonly have boom-irons at their outer ends, like the lower-yards in merchant-ſhips: in the navy, they are moſtly fitted with a boom-ring, and a ſprig eye-bolt driven in the middle of their ends, parallel to its axis, and an iron hoop let in its thickneſs and breadth, and nailed, to prevent ſplitting the yard-arm. Yards that have no inner boom-irons have ſaddles [*Pl.* V. *fig.* 44] for the heel of the boom.

Main and fore topgallant-yards, mizen-yards, ſprit and ſprit-top ſail-yards, have their arms fitted with a ferrule-hoop, and ſprig eye-bolts, as the topſail-yards.

Mizen topſail and topgallant yards have hoops let on their outer ends, but no eye-bolts.

Driver-yards have a ſheave-hole cut through the outer end, and a hoop and eye-bolt.

BOOMS.

Booms are DRIVER, JIB, and STUDDING-SAIL, in ſhips, and MAIN-BOOM, in cutters, ſloops, &c.

DRIVER-BOOMS

have their diameters [*Pl.* V. *fig.* 94] ſet off from a ſtrait line ſtruck along the middle, like a topſail-yard. The given diameter in the Table of Dimenſions is ſet off in the middle, and at the firſt quarter, on each ſide, forty forty-one parts of the diameter in the middle, at the ſecond, eleven-twelfths, at the third, five-ſixths, and, at the ends, two-thirds They are then lined to that ſize, and trimmed like the topſail-yard.

The inner end is commonly fitted with jaws, made of oak, that embrace half the diameter of the maſt. The inner part is one-fourth of what is left on each ſide, and from thence breaks in fair, to the ſize of the inner end of the boom, to which it ſcarfs with a tongue four feet long, trimmed in the end of the boom, rounded, and then faſtened with bolts, hoops, and nails, at the ends. One and ſometimes two holes are bored through the middle of each jaw, fore-and-aft, for the parral that confines it to the maſt, and the ſweep is leathered

An eye-bolt is driven through the middle from the upper ſide, between the ſweep and the ſcarf, and clenched on a ring underneath, for confining the tack of the ſail. A ſheave-ſhole is cut through its length within the outer end of the boom for the ſheet, a hoop is let-on to the outer end, and an eye-bolt driven in the middle of the end parallel to its axis.

Sometimes an iron ſtrap [*Pl.* V. *fig.* 95] with an eye is fitted on the inner end, and faſtened with bolts and hoops, and nailed at the ends. The eye of the ſtrap is confined to a groove, by a pin in a hoop or ſtrap round the maſt.

Commonly, in the merchant-ſervice, an iron hoop is let-on to the inner end, and an iron hook, or neck, driven in the middle, parallel to its axis, that hooks into an eye in a hoop, or a ſtrap

round the maſt, and it is mouſed or forelocked through a hole, to prevent its lifting.

JIB-BOOMS

have [*Pl.* V. *fig.* 80] a ſtrait line ſtruck along the middle; the length ſet up from the butt, and one-third that length for the cap. From thence to the outer end is divided into four quarters, and the given diameter in the Table of Dimenſions is ſet off at the cap, forty forty-one parts of that diameter at the firſt quarter; eleven-twelfths, at the ſecond, five-ſixths, at the third, and two-thirds, at the outer end. They are then lined to that ſize, and hewed plumb; then ſquared and eight-ſquared, and three times and a half the diameter ſet up from the heel, and from thence rounded to the outer end. Let a ſtop be made from the end once and a half the diameter of the boom, and a ſheave-hole half its length within the ſtop from the upper ſide, for the out-hauler, and another ſheave-hole, once and a half the diameter from the heel for the top-rope, be made through the middle of the ſtarboard ſquare next the upper ſide, and a hole bored through between that and the heel, the ſame ſize, for laſhing down the heel.

STUDDING SAIL-BOOMS

trim alike, [*Pl.* V. *fig.* 45, 57, & 63,] from a ſtrait line ſtruck along the middle. The length is ſet up from the heel, the given diameter in the Table of Dimenſions is ſet off at the heel, and at one-third the length, and, for ſo far, lines parallel to the middle line are ſtruck: but decreaſe from thence to two-thirds the given diameter at the ends. They are rounded as before.

The LOWER STUDDING-SAIL-BOOMS [*Pl.* V. *fig.* 57] have an iron hoop let-on to the inner end, and a hook driven in the middle of the end, parallel to its axis, and a hole bored through the outer end the diameter within.

TOP AND TOPGALLANT STUDDING-SAIL-BOOMS have a hole bored through the end. [*Pl.* V. *fig.* 45 & 63.]

MAIN-

MAIN-BOOMS FOR CUTTERS, SLOOPS, &c.

have a ſtrait line ſtruck along the middle, and the length ſet up from the butt the length from the maſt to the ſtern is then ſet off, for the ſtation of the main-ſheet. Then, between the ſheet and inner end, divide four quarters, and between the ſheet and outer ends, two equal parts. Set off the given diameter in the Table of Dimenſions at the ſheet; forty forty-one parts of that diameter at the firſt quarter, eleven-twelfths, at the ſecond, ſeven-eighths, at the third, and two-thirds, at the inner end: between the ſheet and outer end, eleven-twelfths; and three-fourths, at the outer end. The diameters are ſet off, and the boom lined and rounded, as the driver-boom, and finiſhed with jaws at the inner end.

This boom is leathered its diameter on each ſide the ſheet, and comb-cleats nailed over the ſtrap of the block. Without the ſheet are holes bored through for the reef-pendents, or notches underneath, made from the ſolid, and a ſheave-hole, hoop, and eye-bolt, at the outer end, as the ſhip's driver-boom.

GAFFS.

GAFFS [*Pl.* V. *fig.* 87] have their diameters ſet off from a ſtrait line, ſtruck along the middle, and their lengths within eighteen inches ſet up from the butt: then ſet up four feet for ſcarfing on the jaws, and there ſet off the given diameter in the Table of Dimenſions, divide from thence to the end into four quarters; and ſet off forty forty-one parts of the given diameter at the firſt quarter; eleven-twelfths, at the ſecond, four-fifths, at the third, and five-ninths, at the outer end. They are then lined to that ſize and rounded, as before. The jaws are made and finiſhed ſimilar to the booms, but, owing to the gaffs being topped ſo much above a level, the jaws have a great bevelling. At the inner part, they have alſo an eye-bolt, driven

through from the upper ſides, and clenched underneath for the throat-haliards, and one from the under ſide for the nock-earring, ſecuring the ſail and throat downhauler, and ſometimes a ſheave-hole cut through on each ſide, for the throat-brails.

A hoop is let-on to the outer end, and an eye-bolt driven in the middle parallel to its axis, cleats nailed on the 'thwartſhip ſides, the diameter within the outer end, and a ſheave-hole cut through from the upper ſide within the cleats.

TOPS.

The dimenſions of tops are theſe, viz. their breadth athwartſhips, one-third the length of their topmaſts, the length fore-and-aft, three-fourths the breadth. The ſize of the ſquare hole is this, viz. athwartſhips, two-fifths the breadth of the top; fore-and-aft, thirteen-fourteenths the breadth; and its aft ſide is one-fifth the length of the top from the aft ſide of the platform; and it is placed in the middle athwartſhips.

Tops are made thus: [*Pl.* V. *fig.* 43.] The platform of cloſe tops is made of three-inch deals down to a third-rate ſhip, of two inches and a half to a fourth and fifth rate, and of two inches for all under, in the royal navy. The deals are ſcarfed together half their thickneſs from the ſize of the ſquare hole each way to the whole ſize of the top, and the edges fayed cloſe together. The aft ſide to be ſtrait, and the 'thwartſhip ſides ſquare from thence, at the breadth, to the aft ſide of the foremoſt croſs-tree, where the fore part breaks in with an elliptical curve. After the top is trimmed to its dimenſions and the ſcarfs well nailed together, a rim of elm-board (one inch and an eighth thick, in large, and one inch in ſmall, ſhips, and from eight to to ſeven inches broad, except the mizen-tops of ſmall ſhips, which are only ſix inches) is nailed on the upper ſide, to overhang the edge all round, four inches in large, three inches and a half in ſmall, and only three inches on mizen-tops of ſmall ſhips.

Then

Then ſtation the timbers, which are made of elm-plank, from four to two inches thick, according to the ſize of the top, and moulded to the ſame depth on the rim: to be four in number on each 'thwartſhip ſide, equally ſpaced between the aft ſide and breaking in of the ſweep, and ſeven or eight between them on the fore part, and one leſs on the aft ſide. Between the middle timbers on the 'thwartſhip ſides are cut two mortiſes for the futtock-plates, as far aſunder as the timbers will admit, and one on each ſide them, the ſame diſtance, and four inches and a half within the edge, over which is faſtened an iron plate with mortiſes punched through to anſwer the above holes then fay the timbers cloſe to the top and elm rim on their under ſides, from the projection of the rim to the ſquare hole, tapering on the upper ſide, within the rim, with a hollow to wear off to nothing at the ſquare hole, and they are nailed through the top, with two nails in each breadth of deal, and clenched on a rove. Between the timbers are fayed fir fillings, of the ſame thickneſs and nine inches broad, on the 'thwartſhip ſides, tapering from thence to half that breadth round the fore part: they nail as the timbers, and mortiſes are cut through for the futtock-plates, chamfered on the inſide round the fore part of the top. On the aft ſide over the timbers is a gunwale, made with elm-board, eleven or twelve inches broad, and as many eighths of an inch in thickneſs, in large ſhips, (and in proportion for ſmaller,) and it is nailed through the timbers in each edge as before, and four ſquare mortiſes cut through that and the rim for the rail-ſtantions. On the 'thwartſhip ſides, within the fillings, is fayed and ſcored down over the timbers a chock of elm, eight inches broad, and three times deeper than the timbers, and three or more holes bored through, one inch and a half or two inches in diameter, in the middle between the mortiſes, for the futtock-plates, for fixing the ſwivels, and a ſquare iron plate, half an inch thick, let in over the holes. The chocks are nailed through the timbers as before. The ſtantions on the aft ſide are from two or three inches ſquare, and tenon at the heel into mortiſes in the gunwale and through to the under ſide, and at the head into the under ſide of the rail, which is the breadth of the top in length, and as much as the

ſtantions

ſtantions are in thickneſs, and one inch more in depth. The ſtantions are trimmed eight-ſquare in the middle, and the rail rounded on the upper ſide: the whole is well ſecured together, when the top is up in its place.

Yachts and ſmall veſſels often have iron rails and ſtantions on the aft ſide of their tops, for neatneſs.

Battened or open tops have the treſtle and croſs trees framed together, and a rim of elm board, ſimilar to the former, nailed round the extremities. On each ſide the maſt-head, parallel with the treſtle-trees, to the ſize of the ſquare hole, are ſcored into the croſs-trees, pieces the ſame in ſize, and two more on each ſide athwartſhips, ſcored into the latter pieces, lapped underneath the rim, and well nailed thereto. Then a cant of oak, ſimilar to the fir fillings, on the fore part of the former top, is fayed and nailed to half the breadth of the rim, and kept well with the outſide. Then oak battens, one inch or ſeven-eighths thick, and four or ſix inches broad, are fitted fore-and-aft within the cant, except over the ſquare hole, about their breadth aſunder, and are ſecurely nailed to the rim, croſs-trees, and croſs-pieces.

All battened tops are made ſimilar to the above.

DAVITS

for fiſhing the anchor [*Pl.* V. *fig.* 59] to be, in length, three-tenths the breadth of the ſhip, and ſquare at the inner end, one inch to every foot in the length, and at the outer end one inch leſs than the inner end, and trimmed thus: viz. After they are ſquared to the above ſize, they are eight-ſquared, leaving them ſquare at the inner end three-fourteenths the length, and a ſtop of one inch and a half to two inches made at the outer end, its diameter within the end. Three eye-bolts, of one inch and a quarter to ſeven-eighths of an inch diameter, are driven through within the ſtops, one from the upper ſide for the maſt-head, guy, or topping-lift, and one on the fore and after ſides for the guys.

The

The former is well clenched on an iron plate let in the under ſide, the others on a ring. The heel is ſnaped to half its depth the up-and-down way, to fay to the ſhip's ſide and upper ſide of the foie channel; and a large elm cleat, four inches thick, is nailed to the ſide over the heel to prevent its riſing, and another upon the upper ſide of the channel to prevent its ſlipping.

FIRE-BOOMS

trim as lower ſtudding-ſail-booms. the ſame for ſize, and two-thirds their length. The inner end is fitted with a hook, the outer end with a forked iron, driven in the middle parallel with its axis, and a hoop driven on to prevent ſlipping.

METHOD OF FIXING MASTS IN THE ROYAL NAVY AND MERCHANT SERVICE.

After the maſt is raiſed by means of the ſheers, the lower end is fixed it is tenoned into the upper ſide of a large block of oak-timber, called a ſtep, ſecured acioſs the keelſon.

The topmaſt is attached and ſecured to the head of the lower-maſt by a cap, treſtle-trees, and fid.

Between the lower-maſt-head and foremoſt croſs-tree is a ſquare ſpace, bounded on each ſide by the two treſtle-trees. Perpendicularly above which is the foiemoſt hole in the cap, and the head of the lower-maſt is ſolidly fixed in the other hole.

The topmaſt is erected by the top-rope, which raiſes it to the head of the lower-maſt, and the upper end of the topmaſt is guided and conveyed through the holes between the treſtle-trees and cap.

When

When the topmaſt is raiſed to its proper height, the block or ſquare part is fidded on the treſtle-trees by a bar of wood or iron, called a fid, which is driven through a hole athwart the treſtle-trees, and, upon the topmaſt, in the ſame manner, the topgallant-maſt is placed at the head of the topmaſt, and the royal-maſt upon the head of the topgallant-maſt.

PRO-

PROPORTIONS

FOR THE

LENGTHS AND DIAMETERS

OF

Maſts, Yards, &c. in the Royal Navy.

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF MASTS.

LENGTHS OF MASTS.

THE length of the lower deck and extreme breadth being added together, the half is the length of the MAIN-MAST, thus: The length of the lower deck of a ſeventy-four-gun ſhip is a hundred and ſeventy-ſix feet; breadth, extreme, forty-eight feet eight inches, added together, they make two hundred and twenty-four feet eight inches. The half, or a hundred and twelve feet four inches, is the length of the main-maſt, which being determined, the other maſts, yards, &c. bear the following proportions.

FORE-MAST, eight-ninths of the main-maſt.

MIZEN-MAST, one hundred guns, ſeven-eighths, ninety guns to fifty, ſix-ſevenths, forty-four guns to twenty, five-ſixths, of the main-maſt. In ſloops, the mizen-maſt is three-fourths of the main-maſt. When the mizen-maſt ſteps on the lower deck, the depth of the hold is to be deducted from the length here given. This method is now generally practiſed in the Royal Navy.

MAIN-TOPMAST, three-fifths of the main-maſt.

FORE-TOPMAST, eight-ninths of the main-topmaſt.

MIZEN-TOPMAST, three-fourths of the main-topmaſt. In ſloops, the mizen-topmaſt is five-ſeventhſ of the main-topmaſt.

TOPGALLANT-MASTS one-half the length of the topmaſt.

BOWSPRITS of eighty-gun ſhips and upwards, ſeven-elevenths of their main-maſts. Bowſprits of ſeventy-four-gun ſhips and under, three-fifths of their main-maſts.

BRIGS' MAIN-MASTS. The depth in the hold is added to the length and breadth, and one-half is the length of the main-maſt.

CUTTERS' MAIN-MASTS. Add together the length of the deck, the breadth extreme, and depth in the hold, and three-quarters of that ſum is the length of the main-maſt.

DIAMETERS OF MASTS.

MAIN and FORE MASTS of SHIPS, of a hundred to fifty guns incluſive, are one inch in diameter at the partners to every yard in length. Ships of forty-four to thirty-two guns incluſive, nine-tenths of an inch to every yard in length. And ſhips of twenty-eight guns and under, ſeven-eighths of an inch to every yard in the length.

MAIN-MASTS of BRIGS, one inch to every yard in length, and the FORE-MAST nine-tenths of the diameter of the main-maſt.

MASTS OF CUTTERS, three-fourths of an inch in diameter to every yard in length.

MIZEN-MASTS OF SHIPS of a hundred to ſixty-four guns incluſive, three-fifths of the diameter of the main-maſt. Fifty-gun ſhips and under, two-thirds of the diameter of the main-maſt.

MAIN AND FORE TOPMASTS, one inch to every yard in the length of the fore-topmaſt.

MIZEN-TOPMASTS, ſeven-tenths of the diameter of the main-topmaſt.

TOPGALLANT-MASTS, one inch to every yard in their lengths.

ROYAL-MASTS, two-thirds of the diameter of their topgallant-maſts.

BOWSPRITS OF SHIPS of a hundred to ſixty-four guns incluſive, two inches leſs than the diameter of the main-maſt. In fifty-gun ſhips, and under, the ſame diameter as the main-maſt.

PRO-

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF YARDS.

LENGTHS OF YARDS.

MAIN-YARD, eight-ninths of the main-maſt.

FORE-YARD, ſeven-eighths of the main-yard.

MIZEN-YARD, ſix-ſevenths of the main-yard.

MAIN-TOPSAIL-YARD, five-ſevenths of the main-yard.

FORE-TOPSAIL-YARD, ſeven-eighths of the main-topſail-yard.

MIZEN-TOPSAIL-YARD, two-thirds of the main-topſail-yard.

TOPGALLANT-YARDS to ſeventy-four-gun ſhips, two-thirds, all under, three-fifths, of their topſail-yards.

ROYAL-YARDS, one-half of the topſail-yards.

CROSS-JACK-YARD, the ſame as the fore-topſail-yard.

SPRITSAIL-YARD, the ſame as the fore-topſail-yard.

SPRITSAIL-TOPSAIL-YARD, the ſame as the fore-topgallant-yard.

STUDDINGSAIL-YARDS, four-ſevenths of their booms.

DRIVER-YARD, the ſame as the fore-topgallant-yard.

DIAMETERS OF YARDS.

MAIN AND FORE YARDS, at the ſlings, ſeven-tenths of an inch to every yard in the length.

MIZEN-YARD, two-thirds of the diameter of the main-yard.

TOPSAIL-YARDS, five-eighths of an inch to every yard in the length.

TOPGALLANT-YARDS, ſix-tenths of an inch to every yard in the length.

ROYAL-YARDS, one-half the diameter of their topſail-yards.

SPRITSAIL-YARD, the ſame diameter as the fore-topſail-yard.

SPRITSAIL-TOPSAIL-YARD, the ſame diameter as the fore-topgallant-yard.

STUDDINGSAIL-YARDS, one inch in diameter to every five feet in the length.

CROSS-JACK-YARD, the ſame diameter as the fore-topſail-yard.

DRIVER-YARD, the ſame diameter as the fore-topgallant-yard.

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF BOOMS.

LENGTHS OF BOOMS.

LOWER STUDDINGSAIL-BOOMS, five-ninths of the main yard.

TOP STUDDINGSAIL-BOOMS, one-half the length of the yards they go on.

FLYING JIB-BOOM, five-ſevenths of the bowſprit.

DRIVER-BOOM, the ſame length as the main-topſail-yard.

DIAMETERS OF BOOMS.

STUDDINGSAIL-BOOMS, one inch to every five feet in the length.

FLYING JIB-BOOMS, ſeven-eighths of an inch to every yard in the length.

DRIVER-BOOM, the ſame as the fore-topſail-yard.

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF GAFFS.

Length of the gaffs, five-eighths of their reſpective booms.

Diameter of the gaffs, the ſame as their booms.

PRO-

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF STAFFS.

Length of the ENSIGN-STAFF, one-third of the main-maſt, above the taffarel.

Length of the JACK-STAFF, one-half the length of the enſign-ſtaff, above the taffarel.

Diameter of the ENSIGN-STAFF, half an inch to every yard in the length.

Diameter of the JACK-STAFF, three-fourths of an inch to every yard in the length.

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF MASTS, YARDS, &c. FOR SLOOPS, SMACKS, AND HOYS.

LENGTHS OF THE MASTS, YARDS, &c.

MAST AND TOPMAST in one, thrice and three-fourths the breadth of the veſſel.

MAST to the rigging-ſtop or hounds, three-fourths the whole length.

MAST AND TOPMAST to the ſtop of the topmaſt, forty forty-one parts of the whole length.

TOPGALLANT-MAST to the rigging-ſtop, four-ſevenths of the length of the maſt.

BOOM, two-thirds of the maſt.

GAFF, three-fifths of the boom.

SPREAD-YARD, five-eighths of the maſt.

CROSS-JACK-YARD, two-fifths of the maſt.

TOPSAIL-YARD, four-fifths of the croſs-jack-yard.

TOPGALLANT-YARD, five-ſixths of the topſail-yard.

BOWSPRITS, five-ninths of the maſt.

DIAMETERS

DIAMETERS OF THE MASTS, YARDS, &c.

MAST, one-fourth of an inch to every foot in length.

TOPGALLANT-MAST, three-eighths of an inch to every foot in length.

BOOM, three-ſixteenths of an inch to every foot in length.

GAFF, one-fourth of an inch to every foot in length.

SPREAD-YARD, one-ſeventh of an inch to every foot in length.

CROSS-JACK-YARD, two-tenths of an inch to every foot in length.

TOPSAIL-YARD, two-tenths of an inch to every foot in length.

TOPGALLANT-YARD, one-eighth of an inch to every foot in length.

BOWSPRIT, three-eighths of an inch to every foot in length.

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF MASTS, YARDS, &c. FOR BOATS.

LONG-BOATS.

Long-boats, ſloop-faſhion, are maſted by the preceding proportions for ſloops; but with lug-ſails, as follow:

LENGTHS.

MAIN-MAST, twice and a half the breadth of the boat.

FORE-MAST, ſeven-eighths of the main-maſt.

BOWSPRIT, half of the main-maſt.

MAIN-YARD, five-eighths of the main-maſt.

FORE-YARD, five-eighths of the fore-maſt.

DIAMETERS.

MAIN-MAST, one-fourth of an inch to every foot in length.

FORE-MAST, one-fourth of an inch to every foot in length.

MAIN-

MAIN-YARD, one-fourth of an inch to every foot in length.
FORE-YARD, one-fourth of an inch to every foot in length.
BOWSPRIT, five-eighths of an inch to every foot in length.

LAUNCHES AND CUTTERS WITH LUG-SAILS.

LENGTHS.

MAIN-MAST, twice and three-fourths the breadth of the boat.
FORE-MAST, eight-ninths of the main-maſt.
MAIN-YARD, nine-ſeventeenths of the main-maſt.
FORE-YARD, nine-ſeventeenths of the fore-maſt.
MIZEN-MAST, five-eighths of the main-maſt.
SPRIT, two feet longer than the mizen-maſt.
OUTRIGGER, two-thirds of the mizen-maſt.

DIAMETERS.

MAIN-MAST, one-fourth of an inch to every foot in length.
FORE-MAST, one-fourth of an inch to every foot in length
MAIN-YARD, one-fourth of an inch to every foot in length.
FORE-YARD, one-fourth of an inch to every foot in length.
MIZEN-MAST, one-fourth of an inch to every foot in length.
SPRIT, one-ſeventh of an inch to every foot in length
OUTRIGGER, three-ſevenths of an inch to every foot in length.

LAUNCHES AND CUTTERS WITH SETTEE-SAILS.

LENGTHS

MAIN-YARD, thrice and a half the breadth of the veſſel.
MAIN-MAST, four-ſevenths of the main-yard.

FORE-

FORE-MAST, ſeventeen-eighteenths of the main-maſt.
FORE-YARD, nine-tenths of the main-yard.

DIAMETERS.

MASTS, three-eighths of an inch to every foot in the length.
YARDS, one-fourth of an inch to every foot in the length.

BARGES AND PINNACES WITH LATTEEN-SAILS.

LENGTHS.

MASTS, twice the breadth of the boat and eight inches added.
TOPMASTS, the length of the maſt and one-ninth more.
SCARF to the lower-maſt, one-fourth its length.

DIAMETERS.

MASTS, five-ſixteenths of an inch to every foot in length.
TOPMASTS, two-tenths of an inch to every foot in length.

BARGES, PINNACES, AND YAWLS, WITH SPRIT-SAILS.

LENGTHS.

MAIN AND FORE MASTS, twice and one-fourth the breadth of the veſſel.
SPRITS, one-eighth more than the maſt.

DIAMETERS.

MASTS, one-fourth of an inch to every foot in the length.
SPRITS, one-eighth of an inch to every foot in the length.

DIMENSIONS

OF

MASTS AND YARDS

IN THE

ROYAL NAVY

AND

MERCHANT-SERVICE,

BEING THEIR RESPECTIVE LENGTHS AND DIAMETERS.

The diameters are taken at the PARTNERS of lower-masts; (which are at the middle deck in three-decked ships, and at the upper deck in all other ships;) at the CAP in topmasts, top-gallant-masts, and royal masts; at the BED of bowsprits; at the SLINGS of yards; at the MIDDLE of driver-booms, at ONE-THIRD of the length of jib-booms; at the SHEET of mainsail-booms; and at FOUR FEET FROM THE END of gaffs.

N. B. Masts with hoops are made one inch larger than the given diameter in these tables, two feet each way from the partners, to give the hoops a quicker drift.

NAMES OF THE MASTS AND YARDS.	110 GUNS. 2164 TO			
	MASTS or BOOMS.		YARDS.	
	Length Ft. In	Dia In.	Length Ft. In	D I
Main maſt and yard	117 0	39	102 4	2
Main topmaſt and yard	70 0	20 3/8	73 0	1
Main topgallant maſt and yard	35 0	11 5/8	48 9	1
Main royal-yard	—	—	32 0	
Fore maſt and yard	103 6	34 1/2	89 1	2
Fore topmaſt and yard	62 10	20 1/4	64 6	1
Fore topgallant maſt and yard	31 0	10 3/4	43 0	
Fore royal-yard	—	—	27 0	
Mizen maſt and yard	101 4	23	87 0	1
Mizen topmaſt and yard	52 0	14	49 0	1
Mizen topgallant maſt and yard	26 0	8 5/8	32 9	
Mizen royal-yard	—	—	24 0	
Bowſprit	74 0	37	—	—
Spritſail-yard	—	—	64 6	1
Jib-boom	53 0	45 1/4	—	—
Spritſail topſail-yard	—	—	43 0	8
Croſs-jack-yard	—	—	64 6	1
Lower ſtuddingſail boom and yard	56 9	11 1/4	33 0	6
Main topmaſt ſtuddingſail boom and yard	51 2	10 1/8	29 6	6
Main topgallant-ſtuddingſail boom and yard	36 6	7 1/4	21 0	4
Fore topmaſt ſtuddingſail boom and yard	44 6	9	25 6	5
Fore topgallant ſtuddingſail boom and yard	32 3	6 1/2	18 6	3
Enſign-ſtaff	45 0	7 1/2	—	—
Jack-ſtaff	19 6	4	—	—
Fire-boom	38 0	11 1/4	—	—

NS	90 GUNS. 1870 TONS.				80 GUNS. 1620 TONS.				74 GUNS. 1800 TONS			
	Masts or Booms.		Yards.		Masts or Booms.		Yards.		Masts or Booms.		Yards.	
ia.	Length	Dia.	Length	Dia.	Length	Dia	Length	Dia.	Length	Dia.	Length	Dia
n.	Ft. In	In.	Ft. In	In.	Ft. In	In	Ft. In	In.	Ft. In	In	Ft. In.	In.
4	112 c	37 1/4	98 o	22 1/2	107 o	35 5/8	93 o	22	111 o	37	99 o	23
5 1/2	66 o	19 3/4	70 o	14 3/4	64 o	19 1/8	66 6	14 1/8	66 c	19 3/4	72 o	15
o	33 o	11	46 6	9 3/8	32 o	10 1/4	46 o	9 1/4	33 o	11 1/4	46 6	9 1/2
7 3/4	——	——	30 o	7 3/8	——	——	28 o	7	——	——	28 o	7 1/2
1	100 o	33 1/2	85 9	20	95 9	31 1/8	81 4	19 3/8	98 6	32 3/4	85 o	20
3 3/4	59 c	19 1/8	61 o	12 7/8	59 9	19 1/4	58 o	12 1/4	58 8	19 3/4	63 o	13
8 5/8	29 c	9 5/8	40 6	8 1/4	28 6	9 1/2	40 o	8 1/4	29 4	9 3/4	40 6	8 3/8
6 7/8	——	——	25 o	6 3/8	——	——	24 o	6 1/8	——	——	25 o	6 1/2
5	96 6	22 1/8	84 o	15	93 c	21 1/8	76 o	14 1/2	95 c	22 1/8	84 o	15 1/2
2 1/8	49 c	13 1/2	47 o	9 3/4	46 c	13 1/4	43 o	8 7/8	49 o	13 1/2	47 o	9 3/8
5 1/2	24 o	8	31 o	6 1/4	23 o	7 5/8	29 o	5 3/4	24 6	8 1/8	31 6	6 3/8
5	——	——	23 o	4 7/8	——	——	21 o	4 3/8	——	——	23 o	4 3/8
—	71 o	35 1/2	——	——	68 o	34	——	——	67 6	35	——	——
3 1/4	——	——	61 o	12 5/8	——	——	58 o	12 1/4	——	——	62 o	13
—	50 9	14 1/4	——	——	48 c	14	——	——	50 4	14 1/2	——	——
5 5/8	——	——	40 6	8 1/4	——	——	40 o	8 1/4	——	——	40 6	8 1/4
6 3/4	——	——	61 o	12 7/8	——	——	58 o	12 1/4	——	——	62 o	13
3 3/4	54 6	11	31 o	6 1/4	51 6	10 1/4	29 6	6	53 9	10 3/4	31 o	6 1/4
-	49 c	10	28 o	3 3/4	46 6	9 1/8	26 6	5 1/4	48 6	9 3/4	27 3	5 1/2
1 1/4	35 o	7	20 o	4	33 3	6 3/4	19 o	3 3/4	35 o	7	20 o	4
1 1/8	42 10	8 1/2	24 6	5	40 8	8 1/8	23 4	4 3/4	42 6	8 1/2	24 6	5
1 1/4	30 6	6 1/8	17 6	3 1/2	29 c	5 7/8	16 6	3 1/4	31 o	6 1/4	17 9	3 1/2
—	40 c	6 1/2	——	——	39 c	6 1/2	——	——	40 o	6 1/2	——	——
-	18 c	4 1/2	——	——	17 6	4 1/4	——	——	18 o	4 1/2	——	——
-	36 c	11	——	——	34 o	10 1/4	——	——	35 6	10 3/4	——	——

NAMES OF THE MASTS AND YARDS	64 GUNS. 1369 TONS			
	MASTS or BOOMS.		YARDS.	
	Length Ft. In	Dia In.	Length Ft. In.	Dia In.
Main maſt and yard	101 0	33½	90 4	21
Main topmaſt and yard	58 6	17⅝	66 0	13⅜
Main topgallant maſt and yard	29 3	9¾	39 0	7.
Main royal-yard	—	—	27 0	6.
Fore maſt and yard	89 7	29¾	79 6	18.
Fore topmaſt and yard	53 0	17⅝	57 6	12⅛
Fore topgallant maſt and yard	26 6	8¾	34 6	7
Fore royal-yard	—	—	23 0	6
Mizen maſt and yard	86 0	19¾	77 0	14
Mizen-gaff	—	—	—	—
Mizen topmaſt and yard	43 6	12¼	43 3	9
Mizen topgallant maſt and yard	21 9	7⅛	29 0	5¾
Mizen royal-yard	—	—	21 0	4⅛
Bowſprit	60 4	31½	—	—
Spritſail-yard	—	—	57 6	12⅛
Jib-boom	43 9	13	—	—
Spritſail-topſail-yard	—	—	34 6	7
Driver boom and yard	—	—	—	—
Croſs-jack-yard	—	—	57 6	12⅛
Lower ſtuddingſail boom and yard	50 0	10	29 0	5¾
Main topmaſt ſtuddingſail boom and yard	45 0	9	25 9	5⅜
Main topgallant-ſtuddingſail boom and yard	32 8	6½	18 9	3⅜
Fore topmaſt-ſtuddingſail boom and yard	39 9	8	22 9	4½
Fore topgallant-ſtuddingſail boom and yard	28 9	5¼	16 6	3⅛
Enſign-ſtaff	38 0	6¼	—	—
Jack-ſtaff	16 6	4¼	—	—
Fire-boom	33 3	10	—	—

50 GUNS. 1044 TONS							
Masts or Booms.				Yards.			
Length		Dia		Length		Dia.	
Ft.	In.	In.		Ft.	In.	In.	
92	0	29		82	0	19	1/4
53	0	16		60	9	12	1/2
26	6	8	7/8	36	0	7	3/8
				26	0	6	1/4
81	6	26	3/8	72	0	17	
48	0	16		52	6	11	
24	0	8		31	6	6	1/4
				23	0	5	1/2
78	9	19	3/8				
				44	0	11	1/2
40	0	11	1/8	39	0	8	1/4
20	0	6	5/8	26	0	5	1/2
				19	0	4	1/8
56	0	29					
				52	6	11	
39	8	11	3/4				
				31	6	6	1/8
60	9	11	1/2	31	6	6	1/4
				52	6	11	
45	6	9	1/8	26	0	5	1/2
41	0	8	1/8	23	6	4	3/4
30	5	6		17	6	3	1/2
36	0	7	1/4	20	0	4	1/8
26	3	5	1/2	15	0	3	
36	0	6					
15	6	3	3/4				
30	0	9	1/8				

44 GUNS. 879 TONS.							
Masts or Booms.				Yards.			
Length		Dia.		Length		Dia	
Ft.	In	In.		Ft.	In.	In.	
88	0	26	1/4	80	0	18	1/2
53	0	15	3/4	57	6	11	1/8
26	6	8	3/4	36	0	7	3/8
				25	0	5	7/8
78	0	23	5/8	70	0	16	1/2
47	0	15	3/4	52	0	10	3/4
23	6	7	3/4	32	0	6	3/8
				23	0	5	3/8
74	6	17	7/8				
				36	8	11	
40	0	11		39	6	8	
20	0	6	5/8	25	9	5	1/8
				19	0	4	
52	6	26	1/4				
				52	0	10	3/8
39	0	11	1/2				
				32	0	6	1/8
57	6	10	3/4	32	0	6	3/8
				52	0	10	1/4
44	6	9		25	6	5	1/8
40	0	8		23	0	4	3/4
28	9	5	3/4	16	6	3	1/4
35	0	7		20	0	4	
26	0	5	1/4	15	0	3	
35	0	5	5/8				
15	6	3	1/4				
29	6	9					

38 GUNS 951 TONS.							
Masts or Booms.				Yards.			
Length		Dia.		Length		Dia	
Ft.	In	In.		Ft.	In	In.	
90	0	27		81	9	19	
54	0	16	1/8	59	0	12	1/4
27	0	9		37	0	7	1/2
				25	0	6	1/8
80	0	23	5/8	71	6	16	1/2
48	0	16	1/2	53	0	11	1/2
24	0	8		32	9	6	1/2
				23	0	5	1/4
75	7	18	1/8				
				38	0	11	1/2
41	0	11	1/4	40	0	8	1/4
20	6	6	3/4	27	9	5	1/2
				20	0	4	1/2
55	0	27					
				53	0	11	1/2
38	7	11	1/2				
				32	9	6	1/2
59	0	11	1/2	32	9	6	1/2
				53	0	11	1/2
45	0	9		26	0	5	1/4
41	0	8	1/8	23	6	4	3/4
29	6	6		17	0	3	1/2
35	9	7	1/8	20	6	4	1/8
26	6	5	1/2	15	0	3	
35	0	5	5/8				
15	6	3	3/4				
30	0	9					

NAMES OF THE MASTS AND YARDS.	36 GUNS. 871 TONS.			
	MASTS or BOOMS.		YARDS.	
	Length Ft. In.	Dia. In.	Length Ft. In	Dia In
Main maſt and yard	89 0	26	79 0	18
Main topmaſt and yard	53 4	15 3/4	57 0	12
Main topgallant maſt and yard	25 8	8 5/8	34 9	7
Main royal-yard	—	—	25 0	6
Fore maſt and yard	79 6	23 3/8	69 4	16
Fore topmaſt and yard	47 0	15 3/4	51 9	11
Fore topgallant maſt and yard	22 5	7 1/2	31 6	6
Fore royal-yard	—	—	23 0	5
Mizen maſt and gaff	74 8	17 3/4	36 0	11
Mizen topmaſt and yard	40 0	11 1/8	39 4	7
Mizen topgallant maſt and yard	20 0	6 1/2	27 0	5
Mizen royal-yard	—	—	19 0	3
Bowſprit	54 0	26	—	—
Spritſail-yard	—	—	51 9	11
Jib-boom	38 0	11 1/4	—	—
Spritſail-topſail yard	—	—	31 6	6
Driver boom and yard	57 0	11	31 6	6
Croſs-jack-yard	—	—	51 9	11
Lower ſtuddingſail boom and yard	44 0	9	25 6	5 1/8
Main topmaſt ſtuddingſail boom and yard	39 6	8	22 6	4 1/2
Main topgallant ſtuddingſail boom and yard	28 6	5 3/4	16 6	3 1/4
Fore topmaſt ſtuddingſail boom and yard	34 8	7	20 0	4
Fore topgallant ſtuddingſail boom and yard	25 10	5 1/8	15 0	3
Enſign-ſtaff	35 0	5 5/8	—	—
Jack-ſtaff	15 6	3 3/4	—	—
Fire-boom	29 3	9	—	—

32 GUNS. 677 TONS.						28 GUNS 594 TONS.						24 GUNS. 513 TONS.					
Masts or Booms.			Yards.			Masts or Booms.			Yards.			Masts or Booms.			Yards.		
Length		Dia.	Length		Dia.	Length		Dia.	Length		Dia.	Length		Dia.	Length		Dia.
Ft.	In	In.	Ft.	In	In.	Ft.	In	In.	Ft.	In.	In.	Ft.	In.	In.	Ft.	In.	In.
85	0	24 3/4	74	4	17 1/2	81	4	23 5/8	71	3	16 1/2	75	0	22 1/2	65	6	15
51	0	15 1/8	75	0	11 3/8	48	9	14 3/8	52	0	11	45	0	13 1/2	47	0	9 3/4
25	6	8 1/2	33	6	6 1/2	24	4	8	32	6	6 1/2	22	6	7 1/2	29	6	6
			25	0	5 5/8				25	0	5 1/2				23	6	4 7/8
75	0	22	65	0	15	72	0	20 1/2	62	2	14 1/2	66	6	19 1/2	57	8	13 1/4
45	0	15 1/8	48	0	10	43	0	14 3/8	46	0	9 1/2	40	0	13 1/2	41	0	8 5/8
22	6	7 1/2	29	6	5 7/8	21	6	7	28	6	5 5/8	20	0	6 1/2	25	10	5 3/8
			23	0	5				23	0	4 7/8				20	6	4 3/8
72	0	17	35	0	10	69	0	16 3/4	32	6	9 3/4	64	0	15	29	4	8 5/8
38	0	10 5/8	36	9	7	36	7	10	35	0	7 1/4	33	9	9 1/4	31	5	6 1/2
19	0	6 1/4	24	0	5	18	3	6	22	0	4 3/8	16	10	5 1/2	19	6	4
			18	0	3 1/2				17	6	3 5/8				15	8	3 1/4
52	0	25				48	9	23 5/8				45	0	22 1/4			
			48	0	10				46	0	9 3/4				41	0	8 5/8
36	10	10 3/4				35	0	10 1/4				32	6	9 3/8			
			29	6	5 1/2				28	6	5 5/8				25	10	5 3/8
55	0	10	29	6	5 5/8	52	0	9 3/4	28	6	5 1/2	47	0	8 5/8	25	10	5 3/8
			48	0	10				46	0	9 3/4				41	0	8 5/8
41	0	8 3/4	23	6	4 3/8	40	0	8	23	0	4 5/8	36	9	7 1/4	21	0	4 1/4
37	2	7 1/2	21	3	4 1/4	36	0	7 1/8	20	6	4	33	0	6 1/2	19	0	3 7/8
27	6	5 1/2	16	0	3 1/4	26	0	5 1/4	15	0	3	23	6	4 5/8	13	6	2 5/8
32	6	6 1/2	18	6	3 3/4	31	1	6 1/8	17	9	3 1/2	28	10	5 3/4	16	6	3 1/4
24	0	4 7/8	14	0	2 7/8	23	0	4 5/8	13	3	2 5/8	20	6	4 1/8	11	9	2 3/8
34	0	5 1/2				30	0	5 1/4				28	0	5			
15	0	3 3/4				14	0	3 3/8				13	0	3 1/4			
27	3	8 3/4				26	6	8				24	0	7 1/8			

NAMES OF THE MASTS AND YARDS.	20 GUNS. 429 TONS.				SL 3	
	MASTS.		YARDS.		MAS	
	Len. Ft In	Dia In.	Len. Ft In	Dia. In.	Len Ft In	
Main maſt and yard	72 0	21 5/8	63 0	14 1/2	63 0	
Main topmaſt and yard	43 2	12 1/4	45 6	9 1/2	37 6	
Main topgallant maſt and yard	21 7	7 1/4	28 4	5 3/8	18 9	
Main royal-yard	—	—	20 0	4	—	
Fore maſt and yard	64 0	19	55 0	12 5/8	56 0	
Fore topmaſt and yard	38 4	12 3/8	40 0	8 1/2	33 4	
Fore topgallant maſt and yard	19 2	6 3/8	25 0	5	16 8	
Fore royal-yard	—	—	18 0	4 1/4	—	
Mizen maſt and gaff	61 0	14	28 6	8 1/2	48 0	
Mizen topmaſt and yard	32 5	9	31 0	6 1/4	26 9	
Mizen topgallant maſt and yard	16 0	5 1/4	19 6	4	13 0	
Mizen royal-yard	—	—	15 6	3 1/8	—	
Bowſprit	43 6	21 5/8	—	—	37 6	
Spritſail-yard	—	—	40 0	8 1/2	—	
Jib-boom	31 0	9	—	—	27 0	
Spritſail-topſail-yard	—	—	25 0	5	—	
Driver boom and yard	45 6	8 1/2	25 0	5	39 6	
Croſs-jack-yard	—	—	40 0	8 1/2	—	
Lower ſtuddingſail boom and yard	35 0	7	20 0	4	30 6	
Main topmaſt ſtuddingſail boom and yard	32 0	6 3/8	18 6	3 1/4	27 0	
Main topgallant ſtuddingſail boom and yard	22 6	4 1/2	13 0	2 5/8	19 9	
Fore topmaſt ſtuddingſail boom and yard	27 6	5 1/2	15 9	3 1/8	24 2	
Fore topgallant ſtuddingſail boom and yard	20 0	4	11 6	2 1/4	17 6	
Enſign-ſtaff	28 0	5	—	—	24 0	
Jack-ſtaff	13 0	3 1/4	—	—	12 0	
Fire-boom	23 6	7	—	—	20 6	

OOPS of 90 TONS.			NAMES OF THE MASTS AND YARDS.	BRIGS of 200 Tons			
TS.	YARDS.			MASTS.		YARDS	
Dia. In	Len. Ft In	Dia. In.		Len Ft In	Dia In.	Len. Ft In	Dia In.
18 3/8	55 0	12 3/4	Main maſt and yard	56 0	19	42 0	9 3/4
1 1/4	39 6	8 1/4	Main topmaſt and yard	31 0	10	31 6	7
6	25 0	5	Main topgallant maſt and yard	23 6	6 1/4	23 6	5
	17 0	4 1/8	Main royal-yard			15 9	3 1/2
16 3/8	48 5	11 1/4	Fore maſt and yard	49 0	17	42 0	9 3/4
14 1/4	35 0	7 3/8	Fore topmaſt and yard	31 0	10	31 6	7
5 1/8	22 0	4 1/8	Fore topgallant maſt and yard	23 6	6 1/4	23 6	5
	16 0	3 3/4	Fore royal-yard			15 9	3 1/2
12	24 9	7 3/8	Bowſprit and ſpritſail-yard	34 0	17	31 6	7
7 3/4	26 4	5 1/2	Jib-boom and ſpritſail-topſail-yard	24 0	7	23 6	5
4 1/4	16 6	3 1/4	Main-boom and gaff	45 0	10 1/2	28 0	7 1/4
	13 2	2 3/4	Lower ſtuddingſail boom and yard	23 6	4 3/4	13 6	2 3/4
18 3/8			Main topmaſt ſtuddingſail boom and yard	21 0	4 1/8	12 0	2 1/2
	35 0	7 3/8	Main topgallant ſtuddingſail boom and yard	17 9	3	8 9	2 1/4
8			Fore topmaſt ſtuddingſail boom and yard	21 0	4 1/8	12 0	2 1/2
	22 0	4 3/8	Fore topgallant ſtuddingſail boom and yard	17 9	2 1/4	8 9	2 1/4
7 7/8	22 0	4 3/8	Enſign-ſtaff	20 0	3 1/2		
	35 0	7 3/8	Jack-ſtaff	10 0	2 1/2		
6	17 6	3 1/2	CUTTERS of 200 TONS.				
5 3/8	15 6	3 1/8	Main-maſt and topmaſt in one	88 0	22		
4	11 6	2 1/4	Croſs-jack-yard			58 0	9 1/2
5	14 0	2 7/8	Main-topſail-yard			52 0	7 1/2
3 1/2	10 0	2	Main topgallant maſt and yard	44 0	9 3/4	26 0	6
4 1/2			Ditto ſhort	35 0	9 1/2	13 0	3 3/8
3			Bowſprit	64 0	20		
6			Jib-boom	57 0	10		
			Main-boom and water-ſail-yard	66 0	14 3/4	12 0	2 1/2
			Driver-boom and ſpread-yard	42 0	8	60 0	9 1/2
			Gaff and ring-tail-yard	49 6	10 3/4	12 0	2 1/2
			Storm-gaff	21 0	8 1/4		

NAMES OF THE MASTS AND YARDS.	1300 TONS.			
	Masts or Booms.		Yards.	
	Length Ft. In	Dia. In	Length Ft. In.	Dia. In.
Main maſt and yard	96 0	31½	86 0	21
Main topmaſt and yard	56 0	17½	58 0	14
Main topgallant maſt and yard	27 0	9	38 0	8½
Main royal-yard	20 0	6½	24 0	5
Foie maſt and yard	90 0	30	82 0	20
Fore topmaſt and yard	56 0	17½	56 0	13½
Foie topgallant maſt and yard	26 0	9	36 0	8
Foie royal-yard	18 0	6	22 0	5
Mizen maſt and yard	78 0	21½	72 0	13
Mizen topmaſt and yard	41 0	13	40 0	9½
Mizen topgallant maſt and yard	21 0	7	26 0	5½
Mizen royal-yard	12 0	5	16 0	4½
Bowſprit	60 0	31	56 0	11½
Jib-boom	44 0	12½	38 0	8
Driver-boom	62 0	12	—	—
Croſs-jack-yard	—	—	56 0	11½
Lower ſtuddingſail boom and yard	44 0	9	30 0	7
Main topmaſt ſtuddingſail boom and yard	43 0	8½	24 0	6
Main topgallant ſtuddingſail boom and yard	29 0	6	18 0	5
Foie topmaſt ſtuddingſail boom and yard	41 0	8½	24 0	6
Foie topgallant ſtuddingſail boom and yard	27 0	6	17 0	5
Enſign-ſtaff	40 0	7	—	—
Jack-ſtaff	26 0	5½	—	—

1200 TONS.				1100 TONS.				1000 TONS.			
MASTS or BOOMS.		YARDS.		MASTS or BOOMS.		YARDS.		MASTS or BOOMS.		YARDS.	
Length Ft. In	Dia. In.	Length Ft. In.	Dia. In.	Length Ft. In.	Dia. In.	Length Ft. In	Dia. In	Length Ft. In.	Dia. In.	Length Ft. In.	Dia In.
94 0	31	84 0	20½	90 0	30	80 0	20	87 0	29	78 0	19
56 0	17½	58 0	14	56 0	17¼	57 6	13½	52 0	16½	54 0	13
27 0	9	37 6	8¼	27 0	9	37 0	8	26 0	9	36 0	8
20 0	6½	24 0	5	20 0	6½	23 0	5	19 0	6½	22 0	5
88 0	30	80 0	19½	84 0	29½	76 0	18½	81 0	29	72 0	18
54 0	17½	54 0	13¼	52 0	17¼	52 0	13	50 0	16½	52 0	12½
26 0	9	36 0	8	26 0	9	36 0	7¾	24 0	9	34 0	7½
18 0	6	22 0	5	18 0	6	21 0	5	17 0	6	20 0	4½
78 0	21½	70 0	13	78 0	21	68 0	13	76 0	20	66 0	12½
40 0	12½	39 0	9¼	39 0	12	38 0	9	38 0	12	38 0	9
21 0	7	26 0	5½	20 0	6½	26 0	5	19 0	6½	26 0	5½
12 0	5	16 0	4½	12 0	5	16 0	4½	10 0	4½	14 0	4
59 0	30½	55 0	11¼	58 0	30	54 0	11¼	54 0	29	54 0	11¼
42 0	12¼	38 0	8	40 0	12	38 0	8	40 0	12	36 0	8
60 0	11½	—	—	58 0	11	—	—	57 0	11	—	—
—	—	55 0	11¼	—	—	54 0	11¼	—	—	54 0	11¼
42 0	9	29 0	7	41 0	9	28 0	7	40 0	8¾	28 0	7
41 0	8½	23 0	6	40 0	8½	22 0	6	39 0	8¼	22 0	5¾
28 0	6	17 0	5	27 0	6	16 0	5	27 0	6	15 0	5
39 0	8½	23 0	6	37 0	8½	22 0	6	36 0	8½	22 0	5¾
26 6	5¾	16 0	5	26 0	5½	14 0	5	26 0	5½	14 0	5
38 0	7	—	—	36 0	6½	—	—	36 0	6½	—	—
24 0	5	—	—	24 0	5	—	—	22 0	5	—	—

NAMES OF THE MASTS AND YARDS.	900 TONS			
	MASTS or BOOMS.		YARDS.	
	Length Ft. In	Dia In.	Length Ft. In	Dia. In.
Main maſt and yard	86 0	28	76 0	18½
Main topmaſt and yard	50 0	16	52 0	12½
Main topgallant maſt and yard	26 0	9	34 0	8
Main royal-yard	19 0	5½	21 0	4½
Fore maſt and yard	79 0	28	70 0	17
Fore topmaſt and yard	48 0	16	50 0	12
Fore topgallant maſt and yard	23 0	9	32 0	7½
Fore royal-yard	17 0	5½	19 0	4½
Mizen maſt and yard	76 0	20	64 0	12
Mizen topmaſt and yard	37 0	12	35 0	8½
Mizen topgallant maſt and yard	19 0	6	23 0	5
Bowſprit	54 0	28	50 0	10½
Jib-boom	40 0	12	36 0	8
Driver-boom	50 0	10½	—	—
Croſs-jack-yard	—	—	52 0	10½
Lower ſtuddingſail boom and yard	37 0	8½	25 0	6½
Main topmaſt ſtuddingſail boom and yard	35 0	8	20 0	5½
Main topgallant ſtuddingſail boom and yard	25 0	6	14 0	5
Fore topmaſt ſtuddingſail boom and yard	34 0	8½	19 0	6
Fore topgallant ſtuddingſail boom and yard	25 0	5½	14 0	5
Enſign-ſtaff	34 0	6½	—	—
Jack-ſtaff	22 0	4½	—	—

800 TONS.				700 TONS.				600 TONS.			
MASTS or BOOMS.		YARDS.		MASTS or BOOMS.		YARDS.		MASTS or BOOMS		YARDS.	
Length Ft. In.	Dia In.	Length Ft. In.	Dia In.	Length Ft. In.	Dia. In.	Length Ft. In.	Dia. In.	Length Ft. In	Dia. In.	Length Ft. In.	Dia. In.
84 0	27	74 0	18	82 0	26	70 0	16½	78 0	24	62 0	15½
49 0	16	50 0	12	48 0	15½	50 0	12	48 0	15	48 0	12
25 9	9	33 6	8	24 0	8½	32 0	7½	23 0	8	32 0	7½
18 0	5	20 0	4½	—	—	—	—	—	—	—	—
77 0	27	68 0	16	75 0	26	64 0	15	73 0	23½	58 0	14½
47 0	16	48 0	12	46 6	15½	48 0	12	46 0	15	46 0	11½
22 0	8½	30 0	7½	22 0	8½	30 0	7½	22 0	8	30 0	7½
16 0	4½	18 0	4½	—	—	—	—	—	—	—	—
73 0	19	62 0	10½	70 0	18	62 0	10½	68 0	16	60 0	10½
36 0	12	34 0	8½	34 0	11	34 0	8½	30 0	10½	32 0	8
19 0	6	23 0	5	18 0	5½	23 0	5	18 0	5½	22 0	4½
53 0	27	50 0	10½	50 0	25	48 0	9½	50 0	24½	48 0	9½
38 0	12	34 0	7½	36 0	10½	32 0	7	36 0	10½	32 0	7
49 0	10½	—	—	50 0	10½	—	—	50 0	10½	—	—
—	—	50 0	10½	—	—	49 0	10	—	—	48 0	9½
36 0	8	23 0	6	35 0	8	22 0	5½	34 0	8	20 0	5
34 0	8	18 0	5½	33 0	7½	17 0	5	32 0	7½	16 0	5
25 0	5½	14 0	4½	24 0	5½	13 0	4	24 0	5½	12 0	4
33 0	8	17 0	5½	31 0	7½	16 0	5	30 0	7½	15 0	5
24 0	5½	14 0	4½	23 0	5½	13 0	4	22 0	5½	12 0	4
34 0	6	—	—	32 0	6½	—	—	30 0	6½	—	—
22 0	4½	—	—	21 6	4½	—	—	21 0	4½	—	—

NAMES OF THE MASTS AND YARDS.	500 TONS.			
	MASTS or BOOMS.		YARDS.	
	Length Ft. In.	Dia. In.	Length Ft. In.	Dia. In.
Main maſt and yard	72 0	22	52 0	13
Main topmaſt and yard	43 0	14	41 0	10½
Main topgallant maſt and yard	23 0	8	31 0	7
Main royal-yard	15 0	5	20 0	5
Fore maſt and yard	67 0	22	52 0	12½
Fore topmaſt and yard	41 0	14	41 0	10½
Fore topgallant maſt and yard	22 0	8	28 0	6½
Fore royal-yard	14 0	5	19 0	5
Mizen maſt and gaff	63 0	15	32 0	8
Mizen topmaſt and yard	30 0	10	32 0	8
Mizen topgallant maſt and yard	17 0	5½	21 0	5
Bowſprit	48 0	23	39 0	8½
Jib-boom	35 0	10	—	—
Driver-boom	46 0	9	—	—
Croſs-jack-yard	—	—	44 0	9
Lower ſtuddingſail boom and yard	30 0	7½	19 0	5
Main topmaſt ſtuddingſail boom and yard	28 0	7	15 0	4½
Main topgallant ſtuddingſail boom and yard	22 0	5	12 0	4
Fore topmaſt ſtuddingſail boom and yard	28 0	7	15 0	4½
Fore topgallant ſtuddingſail boom and yard	20 0	5	12 0	4
Enſign-ſtaff	30 0	6	—	—
Jack-ſtaff	20 0	5	—	—

400 TONS.				360 to 350 TONS.				330 to 300 TONS.			
MASTS or BOOMS.		YARDS.		MASTS or BOOMS.		YARDS.		MASTS or BOOMS.		YARDS.	
Length Ft. In	Dia. In.	Length Ft. In	Dia. In.	Length Ft. In.	Dia. In.	Length Ft. In.	Dia. In.	Length Ft. In.	Dia. In.	Length Ft. In.	Dia. In.
70 0	21½	50 0	13	68 0	20½	48 0	12	66 0	19	47 0	12
41 0	13	39 0	10	39 0	12½	36 0	9	38 0	12	35 0	9
23 0	7½	29 0	6½	20 0	7	28 0	6½	19 0	6½	26 0	6
15 0	5	20 0	5	14 0	5	18 0	5	13 0	4½	16 0	4
65 0	21	49 0	12½	63 0	20½	47 0	12	61 0	19	45 0	11½
40 0	13	39 0	10	38 0	12½	35 0	9	37 0	12	32 0	8½
21 0	7½	27 0	6	19 0	7	27 0	6¼	18 0	6½	25 0	5¾
14 0	5	19 0	4¾	13 0	5	17 0	4½	12 0	4½	15 0	4
62 0	15	30 0	7½	60 0	14	28 7	7	58 0	13	26 0	6½
30 0	9½	30 0	7½	30 0	9½	30 0	7½	28 0	9	28 0	7
16 0	5	20 0	5	16 0	5	18 0	5	15 0	4½	16 0	4
47 0	21	36 0	7½	44 0	20½	34 0	7½	42 0	19	30 0	7
34 0	10	———	———	34 0	9½	———	———	33 0	9	———	———
40 0	8½	18 0	5½	38 0	8	22 0	5½	38 0	7½	20 0	5
———	———	39 0	8	———	———	36 0	7½	———	———	35 0	7
28 0	7	28 0	5	26 0	6½	16 0	4½	25 0	6	15 0	4½
26 0	6½	15 0	4½	25 0	6	14 0	4	24 0	5¾	12 0	4
20 0	5	12 0	4	19 0	4½	10 0	3½	18 0	4¼	10 0	3½
25 0	6½	15 0	4½	24 0	6	14 0	4	23 0	5¾	12 0	4
19 0	5	12 0	4	18 0	4½	10 0	3½	19 0	4¼	10 0	3½
28 0	6	———	———	28 0	6	———	———	26 0	5½	———	———
20 0	5	———	———	14 0	4	———	———	13 0	4	———	———

NAMES OF THE MASTS AND YARDS	280 to 250 TONS.				BRIGS,	
	MASTS or BOOMS.		YARDS.		MASTS BOOMS.	
	Length Ft. In.	Dia In.	Length Ft. In.	Dia. In.	Length Ft. In.	D I
Main maſt and yard	61 0	18	44 0	11	60 0	1
Main topmaſt and yard	36 0	11	32 0	8	30 0	1
Main topgallant maſt and yard .	18 0	6	23 0	5½	16 6	
Main royal maſt and yard	12 0	4½	15 0	4	—	—
Fore maſt and yard	58 0	18	42 0	10½	54 0	1
Fore topmaſt and yard	35 0	11	32 0	8	32 0	1
Fore topgallant maſt and yard . .	17 0	6	23 0	5½	16 0	
Fore royal maſt and yard	11 6	4½	15 0	4	—	—
Mizen maſt and gaff	54 0	12	25 0	6	—	—
Mizen topmaſt and yard	26 0	8	27 0	6	—	—
Mizen topgallant maſt and yard .	14 0	5	—	—	—	—
Bowſprit and ſpritſail-yard	38 0	18	32 0	7	32 0	1
Jib-boom	32 0	8	—	—	26 7	
Driver boom and yard	36 0	7½	18 0	5	—	—
Main-boom	—	—	—	—	34 0	
Croſs-jack yard	—	—	32 0	7	18 6	
Tryſail-gaff	—	—	—	—	—	—
Main top ſtudding ſail boom and yard	23 0	5	12 0	4	20 0	
Wingſail ſprit	—	—	—	—	—	—
Fore top boom and yard	22 0	5	12 0	4	19 0	
Enſign-ſtaff	25 0	5½	—	—	23 0	
Jack-ſtaff	10 0	3	—	—	9 0	

150 TONS.			KETCHES, 170 TONS.				SCHOONERS, 110 TONS.	
	YARDS.		MASTS or BOOMS.		YARDS.		MASTS AND YARDS.	
or								
ia.	Length	Dia.	Length	Dia.	Length	Dia.		L. Dia
n.	Ft. In	In.	Ft. In.	In.	Ft. In.	In.		Ft In.
6½	38 0	9½	72 0	19	51 0	12	Main-maſt	75 15
0	30 0	7½	36 0	10½	36 0	7½	Main-topgallant-maſt	32 7½
5½	21 0	4½	20 0	4½	24 0	4	Main-topſail yard	38 6
—	—	—	—	—	—	—	Spread-yard	47 7
6½	36 0	9	—	—	—	—	Main-topgallant yard	27 5½
0	30 0	7½	—	—	—	—	Square-ſail yard	38 7½
5½	21 0	4½	—	—	—	—	Fore-maſt	66 15
—	—	—	—	—	—	—	Fore-topgallant maſt	26 6½
—	—	—	49 0	10	18 0	5½	Fore-topſail yard	30 6½
—	—	—	30 0	5½	21 0	4	Fore-topgallant yard	25 5
—	—	—	—	—	—	—	Spread-yard	40 7
6	30 6	6	44 0	14½	31 0	6	Gaff	22 6½
7	—	—	28 0	7¾	—	—	Bowſprit	50 14½
—	—	—	—	—	—	—	Boom	47 10½
8½	—	—	—	—	—	—	Gaff	28 7
6	—	—	—	—	29 0	5½	SLOOPS, 70 TONS.	
—	—	—	—	—	16 0	5	Main-maſt	64 16
4½	10 0	3½	—	—	—	—	Main-topgallant maſt	30 6½
—	—	—	—	—	16 0	5	Square-ſail, or croſs-jack-yard	40 8
4½	10 0	3½	—	—	—	—	Main-topſail yard	24 6
4½	—	—	22 0	4	—	—	Bowſprit	40 14
3	—	—	8 0	3	—	—	Jib-boom	32 6½
							Main-boom	48 10
							Gaff	28 7

A FRACTIONAL TABLE OF THE PROPORTION THAT EVERY PART OF A MAST OR YARD BEARS TOWARD THE GIVEN DIAMETER IN THE TABLES OF DIMENSIONS.

	Quarters.			Head		Heel.
	1ſt.	2d.	3d.	Lower part.	Upper part	—
Standing-maſts that are cheeked ... { fore-and-aft	$\frac{60}{71}$	$\frac{14}{15}$	$\frac{6}{7}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{6}{7}$
athwartſhip	$\frac{60}{61}$	$\frac{14}{15}$	$\frac{6}{7}$	$\frac{6}{7}$	$\frac{2}{3}$	$\frac{6}{7}$
Standing-maſts that head themſelves	$\frac{60}{61}$	$\frac{14}{15}$	$\frac{6}{7}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{6}{7}$
Top-maſts, gallant-maſts, and royal-maſts	$\frac{60}{61}$	$\frac{14}{15}$	$\frac{6}{7}$	$\frac{9}{13}$	$\frac{6}{11}$	—
				Arms.		
Mizen-yard. { Lower-arm	$\frac{60}{61}$	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{2}{3}$	—	—
Upper-arm	$\frac{30}{31}$	$\frac{7}{8}$	$\frac{7}{10}$	$\frac{2}{3}$	—	—
Yards in general	$\frac{30}{31}$	$\frac{7}{8}$	$\frac{7}{10}$	$\frac{3}{7}$	—	—
Bowſprit	$\frac{60}{61}$	$\frac{11}{12}$	$\frac{4}{5}$	$\frac{5}{9}$	Outer End.	$\frac{6}{7}$
				Ends.		
Driver-booms	$\frac{40}{41}$	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{2}{3}$	—	—
				fo end	af. end	middle.
Main-booms	$\frac{40}{41}$	$\frac{12}{13}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{11}{12}$
Gaffs	$\frac{40}{41}$	$\frac{11}{12}$	$\frac{4}{5}$	$\frac{5}{9}$	—	—
Heeling. { Standing-maſts	$\frac{2}{3}$ athwartſhip.			—	$\frac{1}{2}$ fore&aft.	
Bowſprit	$\frac{7}{12}$ athwartſhip.			$\frac{2}{7}$ up and down.		

LENGTHS OF

The cheeks $\frac{3}{7}$, if oak, and $\frac{9}{20}$, if fir, of the length of the maſt.

The head of the main and fore maſts, 6 inches to every yard of the maſt's length.

The head of the mizen-maſt, and main and fore topmaſts, 4 inches to every yard of the length.

The head of the mizen-topmaſt, and all topgallant-maſts, $3\frac{1}{2}$ inches to every yard of the length.

Long pole-heads to topgallant-maſts $\frac{2}{3}$ of the length of the ſtop, (that is, when the $3\frac{1}{2}$ inches to a yard is taken out of the whole length). Proper pole-heads to be $\frac{3}{13}$ of that length; and ſtump pole-heads $3\frac{1}{2}$ inches to every yard in length.

The hounds of all lower-maſts $\frac{7}{13}$ of the length of the head.

The topmaſt $\frac{3}{5}$ of the length of the head.

EXPLANATION

EXPLANATION OF THE PROPORTIONS IN THE FRACTIONAL-TABLE.

The diameters at the quarters being given in what maſt-makers call fractional parts of the diameter at the partners, ſlings, &c. obſerve, that the firſt quarter of the main-maſt is $\frac{60}{61}$; that is, if the diameter of a maſt at the partners be divided into 61 equal parts, then the diameter of the firſt quarter is to contain 60 of thoſe 61 parts. Now, the diameter at the partners of a 74-gun ſhip's main-maſt being 37 inches, we have three terms of the Rule of Three given, and thus expreſſed: if 61 parts at the partners require 60 parts at the firſt quarter, what will 37 inches at the partners require at the firſt quarter? Anſwer, $36\frac{3}{8}$ inches: then, by uſing the ſame operation as for finding the firſt quarter, you will find the ſecond quarter, $34\frac{1}{2}$; the third quarter, $31\frac{3}{4}$; the head, $27\frac{3}{4}$, the upper part of the head, $23\frac{1}{8}$; and, the heel, $31\frac{3}{4}$ inches.

In the Rule of Three there are three numbers given; and, if the ſecond be multiplied by the third, and the product be divided by the firſt, the quotient will give the fourth term, which will have the ſame proportion to the third that the ſecond term has to the firſt.

Thus, by means of the preceding TABLE OF FRACTIONAL PARTS, *and the* TABLE OF GIVEN DIAMETERS, *the diameters of maſts, yards, &c. at their various quarters, heads, and heels, may be eaſily calculated. But, to prevent the neceſſity of calculation, which may not at all times be convenient, the ſubſequent tables of diameters are given, for ready reference.*

TABLES

OF THE

DIAMETERS

OF

MASTS, BOWSPRITS, YARDS, BOOMS, AND GAFFS,

AT THEIR

QUARTERS, HEADS, HEELS, &c.

CALCULATED IN PROPORTION TO THEIR RESPECTIVE

GIVEN DIAMETERS AT THE PARTNERS,

BED, SLINGS, &c.

DIAMETERS OF LOWER-MASTS AT THEIR RESPECTIVE QUARTERS, HEADS, HEELS, &c.

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER AT THE PARTNERS, IN THE TABLE OF DIMENSIONS.

Diameter at the Partners.	Quarters.			Heads				Heels
				Of Masts with Cheeks			Of Masts that Head themselves	
				Lower Part.		Upper Part	Upper Part.*	
	60/61	14/15	6/7	6/7	3/4	2/3	5/8	6/7
	1st	2d	3d	Th. Sh	Fo & Af			
Inches	Inches	Inches	Inches	Inches.	Inches	Inches.	Inches	Inches.
40	39 3/8	37 2/8	34 3/8	34 3/8	30	26 5/8	25	34 3/8
39 1/2	38 7/8	36 7/8	34	34	29 5/8	26 3/8	24 3/4	34
39	38 3/8	36 3/8	33 1/2	33 1/2	29 1/4	26	24 3/8	33 1/2
38 1/2	37 5/8	35 7/8	33	33	28 7/8	25 5/8	24	33
38	37 3/8	35 3/8	32 1/2	32 1/2	28 1/2	25 3/8	23 3/4	32 1/2
37 1/2	36 1/8	35	32 1/8	32 1/8	28 1/8	25	23 3/8	32 1/8
37	36 3/8	34 1/2	31 3/4	31 3/4	27 3/4	24 5/8	23 1/8	31 3/4
36 1/2	35 7/8	34	31 3/8	31 3/8	27 3/8	24 3/8	22 7/8	31 3/8
36	35 3/8	33 5/8	30 7/8	30 7/8	27	24	22 1/2	30 7/8
35 1/2	34 7/8	33 1/8	30 1/2	30 1/2	26 5/8	23 3/4	22 1/4	30 1/2
35	34 3/8	32 5/8	30	30	26 1/4	23 3/8	21 7/8	30
34 1/2	33 7/8	32 1/8	29 1/2	29 1/2	25 7/8	23	21 1/2	29 1/2
34	33 3/8	31 5/8	29 1/8	29 1/8	25 1/2	22 5/8	21 1/4	29 1/8
33 1/2	32 7/8	31 1/8	28 3/4	28 3/4	25 1/8	22 3/8	21	28 3/4
33	32 1/2	30 3/4	28 1/4	28 1/4	24 3/4	22	20 5/8	28 1/4
32 1/2	31 7/8	30 1/4	27 7/8	27 7/8	24 3/8	21 3/4	20 1/4	27 7/8
32	31 1/2	29 3/4	27 1/2	27 1/2	24	21 3/8	20	27 1/2
31 1/2	31	29 3/8	27	27	23 5/8	21	19 3/4	27
31	30 1/2	28 7/8	26 5/8	26 5/8	23 1/4	20 5/8	19 1/2	26 5/8
30 1/2	30	28 1/2	26	26	22 7/8	20 3/8	19 1/8	26
30	29 1/2	28	25 3/4	25 3/4	22 1/2	20	18 7/8	25 3/4
29 1/2	29	27 1/2	25 1/4	25 1/4	22 1/8	19 5/8	18 1/2	25 1/4
29	28 1/2	27	24 7/8	24 7/8	21 3/4	19 3/8	18 1/8	24 7/8

* The lower part of the heads of masts that head themselves is 3/4 (both fore-and-aft and athwartships) of the given diameter at the partners.

Diameter at the Partners.	Quarters.			Heads				Heels
				Of Masts with Cheeks.			Of Masts that Head themselves	
				Lower Parts		Upper Part.	Upper Part.*	
	60/61	14/15	6/7	6/7 Th Sh	3/4 Fo & Af	2/3	5/8	6/7
	1ft	2d	3d					
Inche	Inches	Inches	Inche	Inches	Inches	Inches	Inches	Inches.
28 1/2	28	26 1/2	24 3/8	24 3/8	21 3/8	19	17 3/4	24 3/8
28	27 1/2	26 1/8	24	24	21	18 5/8	17 1/2	24
27 1/2	27	25 5/8	23 1/2	23 1/2	20 5/8	18 3/8	17 1/8	23 1/2
27	26 1/2	25 1/4	23 1/8	23 1/8	20 1/4	18	16 7/8	23 1/8
26 1/2	26	24 3/4	22 3/4	22 3/4	19 7/8	17 5/8	16 5/8	22 3/4
26	25 1/2	24 1/4	22 1/4	22 1/4	19 1/2	17 1/16	16 1/4	22 1/4
25 1/2	25	23 3/4	21 7/8	21 7/8	19 1/8	17	15 7/8	21 7/8
25	24 1/2	23 1/4	21 3/8	21 3/8	18 3/4	16 5/8	15 5/8	21 3/8
24 1/2	24	22 3/4	21	21	18 3/8	16 1/16	15 1/4	21
24	23 1/2	22 3/8	20 1/2	20 1/2	18	16	15	20 1/2
23 1/2	23 1/8	21 7/8	20 1/8	20 1/8	17 5/8	15 5/8	14 3/4	20 1/8
23	22 5/8	21 1/2	19 3/4	19 3/4	17 1/4	15 1/16	14 1/2	19 3/4
22 1/2	22 1/8	21	19 1/4	19 1/4	16 7/8	15	14 1/8	19 1/4
22	21 5/8	20 1/2	18 7/8	18 7/8	16 1/2	14 5/8	13 3/4	18 7/8
21 1/2	21 1/8	20	18 3/8	18 3/8	16 1/8	14 1/16	13 1/2	18 3/8
21	20 5/8	19 5/8	18	18	15 3/4	14	13 1/8	18
20 1/2	20 1/8	19 1/8	17 5/8	17 5/8	15 3/8	13 1/16	12 3/4	17 5/8
20	19 3/4	18 3/4	17 1/8	17 1/8	15	13 1/16	12 1/2	17 1/8
19 1/2	19 1/8	18 1/8	16 3/4	16 3/4	14 5/8	13	12 1/8	16 3/4
19	18 3/4	17 3/4	16 1/4	16 1/4	14 1/4	12 1/16	11 7/8	16 1/4
18 1/2	18 1/8	17 1/4	15 3/4	15 3/4	13 7/8	12 3/4	11 1/2	15 3/4

Mizen-Masts or Masts that head themselves.

	60/61	14/15	6/7	3/4	3/4		5/8	6/7
18	17 3/4	16 1/2	15 1/2	13 1/2	13 1/2		11 1/2	15 1/2
17 1/2	17 1/8	16 1/4	15	13 1/8	13 1/8		11	15
17	16 3/4	15 7/8	14 1/2	12 3/4	12 3/4		10 5/8	14 1/2
16 1/2	16 1/8	15 3/8	14 1/8	12 3/8	12 3/8		10 3/8	14 1/8
16	15 3/4	14 7/8	13 3/4	12	12		10	13 3/4
15 1/2	15 1/4	14 1/2	13 1/4	11 5/8	11 5/8		9 3/4	13 1/4
15	14 3/4	14	12 7/8	11 1/4	11 1/4		9 3/8	12 7/8
14 1/2	14 1/4	13 1/2	12 1/2	10 7/8	10 7/8		9 1/8	12 1/2
14	13 3/4	13	12	10 1/2	10 1/2		8 3/4	12
13 1/2	13 1/4	12 1/2	11 1/2	10 1/8	10 1/8		8 1/2	11 1/2
13	12 3/4	12 1/8	11 1/8	9 3/4	9 3/4		8 1/8	11 1/8
12 1/2	12 1/4	11 5/8	10 5/8	9 3/8	9 3/8		7 7/8	10 5/8
12	11 3/4	11 1/8	10 1/4	9	9		7 1/2	10 1/4
11 1/2	11 1/4	10 5/8	9 7/8	8 5/8	8 5/8		7 1/16	9 7/8
11	10 3/4	10 1/4	9 1/2	8 1/4	8 1/4		6 7/8	9 1/2
10 1/2	10 1/4	9 3/4	9	7 7/8	7 7/8		6 5/8	9
10	9 3/4	9 1/4	8 5/8	7 1/2	7 1/2		6 1/4	8 5/8
9 1/2	9 1/4	8 7/8	8 1/8	7 1/8	7 1/8		5 15/16	8 1/8
9	8 7/8	8 3/8	7 3/4	6 3/4	6 3/4		5 5/8	7 3/4

DIAMETERS

OF

TOP-MASTS, GALLANT-MASTS, AND ROYAL-MASTS,

AT THEIR RESPECTIVE

QUARTERS, HEADS, &c.

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER AT THE CAP, IN THE TABLE OF DIMENSIONS.

Diameter in the Cap.	Quarters.			Head.		Diameter in the Cap	Quarters			Head.	
	60/61 1st	14/15 2d	6/7 3d	9/13 Lower Part	6/11 Upper Part.		60/61 1st	14/15 2d	6/7 3d	9/13 Lower Part	6/11 Upper Part
Inc	Inc.	Inc.	Inc.	Inc.	Inc	Inc.	Inc.	Inc	Inc.	Inc.	Inc
22	21 5/8	20 1/2	18 7/8	15 1/4	12	12	11 3/4	11 1/8	10 1/4	8 5/16	6 5/8
21 1/2	21 1/8	20	18 3/8	14 7/8	11 3/4	11 1/2	11 1/4	10 5/8	9 7/8	7 5/16	6 1/4
21	20 5/8	19 5/8	18	14 1/2	11 1/2	11	10 3/4	10 1/4	9 1/2	7 5/8	6
20 1/2	20 1/8	19 1/8	17 5/8	14 1/8	11 1/8	10 1/2	10 1/4	9 3/4	9	7 1/4	5 3/4
20	19 3/4	18 3/4	17 1/8	13 7/8	10 7/8	10	9 3/4	9 1/4	8 5/8	6 1/16	5 1/2
19 1/2	19 1/8	18 1/8	16 3/4	13 1/2	10 5/8	9 1/2	9 1/4	8 7/8	8 1/8	6 9/16	5 1/4
19	18 3/4	17 3/4	16 1/4	13 1/8	10 3/8	9	8 7/8	8 1/8	7 3/4	6 1/4	5
18 1/2	18 1/8	17 1/4	15 3/4	12 7/8	10 1/8	8 1/2	8 3/8	7 7/8	7 1/4	5 1/16	4 5/8
18	17 3/4	16 3/4	15 1/2	12 1/2	9 7/8	8	7 7/8	7 7/16	6 7/8	5 1/2	4 3/8
17 1/2	17 1/8	16 1/4	15	12 1/8	9 1/2	7 1/2	7 3/8	7	6 3/8	5 1/8	4 1/8
17	16 3/4	15 7/8	14 1/2	11 3/4	9 1/4	7	6 7/8	6	5 7/8	4 7/8	3 7/8
16 1/2	16 1/8	15 3/8	14 1/8	11 3/8	9	6 1/2	6 3/8	6 1/16	5 5/8	4 1/2	3 5/8
16	15 3/4	14 7/8	13 3/4	11 1/16	8 3/4	6	5 7/8	5 5/8	5 1/8	4 1/8	3 1/4
15 1/2	15 1/4	14 1/2	13 1/4	10 3/4	8 1/2	5 1/2	5 3/8	5 1/8	4 3/4	3 1/16	3
15	14 3/4	14	12 7/8	10 3/8	8 1/4	5	4 7/8	4 5/8	4 1/4	3 1/16	2 3/4
14 1/2	14 1/4	13 1/2	12 1/2	10	7 7/8	4 1/2	4 3/8	4 1/8	3 7/8	3 1/8	2 1/2
14	13 3/4	13	12	9 3/4	7 5/8	4	3 7/8	3 3/4	3 5/8	2 3/4	2 1/4
13 1/2	13 1/4	12 1/2	11 1/2	9 3/8	7 3/8	3 1/2	3 3/8	3 1/4	3	2 3/8	1 7/8
13	12 3/4	12 1/8	11 1/8	9	7 1/8	3	2 15/16	2 3/4	2 5/8	2 1/8	1 5/8
12 1/2	12 1/4	11 5/8	10 5/8	8 5/8	6 7/8						

DIAMETERS

OF

BOWSPRITS

AT THEIR DIFFERENT

QUARTERS, &c.

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER AT THE BED, IN THE TABLE OF DIMENSIONS.

Diameter at the Bed.	Quarters 60/61 1ft	11/12 2d	4/5 3d	Outer End	6/7 Heels.	Diameter at the Bed.	Quarters 60/61 1ft	11/12 2d	4/5 3d	Outer End	6/7 Heels.
Inc.	Inc.	Inc.	Inc	Inc	Inc.	Inc.	Inc	Inc	Inc	Inc.	Inc.
38	37 3/8	34 7/8	30 3/8	21	32 1/2	25	24 1/2	22 7/8	20	13 7/8	21 3/8
37 1/2	36 7/8	34 3/8	30	20 3/4	32 1/8	24 1/2	24	22 1/2	19 5/8	13 5/8	21
37	36 3/8	34	29 1/2	20 1/2	31 3/4	24	23 1/2	22	19 1/4	13 1/4	20 1/8
36 1/2	35 7/8	33 1/2	29 1/8	20 1/4	31 1/4	23 1/2	23 1/8	21 1/2	18 3/4	13	20 1/8
36	35 3/8	33	28 3/4	20	30 7/8	23	22 5/8	21 1/8	18 3/8	12 3/4	19 3/4
35 1/2	34 7/8	32 5/8	28 3/8	19 3/4	30 1/2	22 1/2	22 1/8	20 5/8	18	12 1/2	19 1/4
35	34 3/8	32 1/8	28	19 1/2	30	22	21 5/8	20 1/8	17 1/2	12 1/4	18 7/8
34 1/2	33 7/8	31 5/8	27 5/8	19 1/4	29 1/2	21 1/2	21 1/8	19 3/4	17 1/8	12	18 3/8
34	33 3/8	31 1/8	27 1/4	18 7/8	29 1/8	21	20 5/8	19 1/4	16 3/4	11 3/4	18
33 1/2	32 7/8	30 5/8	26 3/4	18 5/8	28 3/4	20 1/2	20 1/8	18 7/8	16 3/8	11 1/2	17 5/8
33	32 1/2	30 1/4	26 3/8	18 3/8	28 1/4	20	19 3/4	18 1/4	16	11 1/8	17 1/8
32 1/2	31 7/8	29 3/4	26	18	27 7/8	19 1/2	19 1/8	17 7/8	15 5/8	10 7/8	16 3/4
32	31 1/2	29 3/8	25 5/8	17 3/4	27 1/2	19	18 3/4	17 1/2	15 1/8	10 1/2	16 1/4
31 1/2	31	28 7/8	25 1/4	17 1/2	27	18 1/2	18 1/8	17	14 3/4	10 1/8	15 3/4
31	30 1/2	28 1/2	24 3/4	17 1/4	26 5/8	18	17 3/8	16 1/2	14 3/8	10	15 1/2
30 1/2	30	28	24 3/8	17	26	17 1/2	17 1/8	16	14	9 3/4	15
30	29 1/2	27 1/2	24	16 3/4	25 3/4	17	16 3/4	15 1/2	13 5/8	9 1/2	14 1/2
29 1/2	29	27	23 5/8	16 1/2	25 1/4	16 1/2	16 1/8	15 1/8	13 1/8	9 1/4	14 1/8
29	28 1/2	26 5/8	23 1/4	16 1/8	24 7/8	16	15 3/4	14 5/8	12 3/4	9	13 3/4
28 1/2	28	26	22 3/4	15 7/8	24 3/8	15 1/2	15 1/4	14 1/8	12 3/8	8 5/8	13 1/4
28	27 1/2	25 5/8	22 3/8	15 1/2	24	15	14 3/4	13 7/8	12	8 3/8	12 7/8
27 1/2	27	25 1/4	22	15 1/4	23 5/8	14 1/2	14 1/4	13 1/4	11 5/8	8	12 1/2
27	26 1/2	24 3/4	21 5/8	15	23 1/8	14	13 3/4	12 7/8	11 1/8	7 3/4	12
26 1/2	26	24 1/4	21 1/4	14 3/4	22 3/4	13 1/2	13 1/4	12 3/8	10 3/4	7 1/2	11 1/2
26	25 1/2	23 7/8	20 3/4	14 1/2	22 1/4	13	12 3/4	11 7/8	10 3/8	7 1/4	
25 1/2	25	23 3/8	20 3/8	14 1/8	21 7/8	12 1/2	12 1/4	11 1/2	10	7	10 5/8

DIAMETERS

OF

MIZEN-YARDS,

AT THEIR DIFFERENT

QUARTERS,

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER AT THE SLINGS, IN THE TABLE OF DIMENSIONS.

Diameter at the Slings.	UPPER ARM. Quarters.				LOWER ARM. Quarters.			
	$\frac{30}{33}\frac{0}{1}$ 1st	$\frac{7}{8}$ 2d	$\frac{7}{10}$ 3d	$\frac{2}{5}$ Arm	$\frac{60}{61}$ 1st	$\frac{11}{11}\frac{1}{2}$ 2d	$\frac{5}{6}$ 3d	$\frac{2}{3}$ Arm
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
17	$16\frac{1}{2}$	$14\frac{7}{8}$	$11\frac{7}{8}$	$6\frac{3}{4}$	$16\frac{3}{4}$	$15\frac{1}{2}$	$14\frac{1}{8}$	$11\frac{3}{8}$
$16\frac{1}{2}$	16	$14\frac{3}{8}$	$11\frac{1}{2}$	$6\frac{5}{8}$	$16\frac{1}{8}$	$15\frac{1}{8}$	$13\frac{3}{4}$	11
16	$15\frac{1}{2}$	14	$11\frac{3}{8}$	$6\frac{3}{8}$	$15\frac{3}{4}$	$14\frac{5}{8}$	$13\frac{3}{8}$	$10\frac{3}{4}$
$15\frac{1}{2}$	15	$13\frac{1}{2}$	$10\frac{7}{8}$	$6\frac{1}{8}$	$15\frac{1}{4}$	$14\frac{1}{8}$	13	$10\frac{3}{8}$
15	$14\frac{1}{2}$	$13\frac{1}{8}$	$10\frac{1}{2}$	6	$14\frac{3}{4}$	$13\frac{7}{8}$	$12\frac{1}{2}$	10
$14\frac{1}{2}$	14	$12\frac{5}{8}$	$10\frac{1}{8}$	$5\frac{3}{4}$	$14\frac{1}{4}$	$13\frac{1}{4}$	12	$9\frac{3}{4}$
14	$13\frac{1}{2}$	$12\frac{1}{4}$	$9\frac{3}{4}$	$5\frac{5}{8}$	$13\frac{3}{4}$	$12\frac{7}{8}$	$11\frac{3}{4}$	$9\frac{3}{8}$
$13\frac{1}{2}$	13	$11\frac{1}{4}$	$9\frac{1}{2}$	$5\frac{3}{8}$	$13\frac{1}{4}$	$12\frac{3}{8}$	$11\frac{1}{4}$	9
13	$12\frac{5}{8}$	$11\frac{3}{8}$	$9\frac{1}{16}$	$5\frac{1}{8}$	$12\frac{3}{4}$	$11\frac{7}{8}$	$10\frac{7}{8}$	$8\frac{3}{4}$
$12\frac{1}{2}$	$12\frac{1}{8}$	$10\frac{7}{8}$	$8\frac{3}{4}$	5	$12\frac{1}{4}$	$11\frac{1}{2}$	$10\frac{3}{8}$	$8\frac{3}{8}$
12	$11\frac{5}{8}$	$10\frac{1}{2}$	$8\frac{7}{16}$	$4\frac{7}{8}$	$11\frac{1}{4}$	11	10	8
$11\frac{1}{2}$	$11\frac{1}{8}$	10	8	$4\frac{5}{8}$	$11\frac{1}{4}$	$10\frac{1}{2}$	$9\frac{5}{8}$	$7\frac{5}{8}$
11	$10\frac{5}{8}$	$9\frac{5}{8}$	$7\frac{3}{4}$	$4\frac{3}{8}$	$10\frac{3}{4}$	$10\frac{1}{16}$	$9\frac{1}{8}$	$7\frac{3}{8}$
$10\frac{1}{2}$	$10\frac{1}{8}$	$9\frac{1}{8}$	$7\frac{3}{8}$	$4\frac{1}{4}$	$10\frac{1}{4}$	$9\frac{5}{8}$	$8\frac{3}{4}$	7
10	$9\frac{3}{4}$	$8\frac{3}{4}$	7	4	$9\frac{1}{4}$	$9\frac{1}{8}$	$8\frac{3}{8}$	$6\frac{5}{8}$
$9\frac{1}{2}$	$9\frac{1}{4}$	$8\frac{1}{4}$	$6\frac{5}{8}$	$3\frac{3}{4}$	$9\frac{1}{4}$	$8\frac{3}{4}$	$7\frac{7}{8}$	$6\frac{3}{8}$
9	$8\frac{3}{4}$	$7\frac{7}{8}$	$6\frac{1}{4}$	$3\frac{5}{8}$	$8\frac{7}{8}$	$8\frac{1}{4}$	$7\frac{1}{2}$	6
$8\frac{1}{2}$	$8\frac{1}{4}$	$7\frac{3}{8}$	$5\frac{15}{16}$	$3\frac{3}{8}$	$8\frac{3}{8}$	$7\frac{3}{4}$	$7\frac{7}{16}$	$5\frac{5}{8}$
8	$7\frac{3}{4}$	7	$5\frac{5}{8}$	$3\frac{3}{16}$	$7\frac{7}{8}$	$7\frac{3}{8}$	$6\frac{5}{8}$	$5\frac{3}{8}$
$7\frac{1}{2}$	$7\frac{1}{4}$	$6\frac{7}{8}$	$5\frac{1}{4}$	3	$7\frac{3}{8}$	$6\frac{7}{8}$	$6\frac{1}{4}$	5
7	$6\frac{3}{4}$	$6\frac{1}{8}$	$4\frac{15}{16}$	$2\frac{13}{16}$	$6\frac{7}{8}$	$6\frac{3}{8}$	$5\frac{7}{8}$	$4\frac{5}{8}$
$6\frac{1}{2}$	$6\frac{1}{4}$	$5\frac{3}{4}$	$4\frac{9}{16}$	$2\frac{5}{8}$	$6\frac{3}{8}$	6	$5\frac{3}{8}$	$4\frac{3}{8}$
6	$5\frac{3}{4}$	$5\frac{1}{4}$	$4\frac{1}{4}$	$2\frac{7}{16}$	$5\frac{7}{8}$	$5\frac{1}{2}$	5	4
$5\frac{1}{2}$	$5\frac{3}{8}$	$4\frac{7}{8}$	$3\frac{7}{8}$	$2\frac{1}{4}$	$5\frac{3}{8}$	5	$4\frac{5}{8}$	$3\frac{5}{8}$
5	$4\frac{7}{8}$	$4\frac{3}{8}$	$3\frac{1}{2}$	2	$4\frac{7}{8}$	$4\frac{1}{2}$	$4\frac{1}{8}$	$3\frac{3}{8}$

DIAMETERS

OF

YARDS IN GENERAL

AT THEIR DIFFERENT

QUARTERS,

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER

AT THE SLINGS, IN THE TABLE OF DIMENSIONS

Diameter at the Slings.	Quarters.				Diameter at the Slings.	Quarters.			
	1st	2d	3d	Arm		1st	2d	3d	Arm
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
25	24 1/8	21 7/8	17 1/2	10 3/4	13	12 1/2	11 1/4	9 1/16	5 9/16
24 1/2	23 5/8	21 3/8	17 1/8	10 1/2	12 1/2	12 1/16	10 7/8	8 3/4	5 3/8
24	23 1/4	21	16 3/4	10 1/4	12	11 5/8	10 1/2	8 3/8	5 1/8
23 1/2	22 3/4	20 3/8	16 1/2	10 1/16	11 1/2	11 1/16	10	8	4 15/16
23	22 1/4	20	16 1/16	9 7/8	11	10 5/8	9 5/8	7 3/4	4 3/4
22 1/2	21 3/4	19 3/4	15 3/4	9 5/8	10 1/2	10 1/16	9 1/8	7 3/8	4 1/2
22	21 1/4	19 1/4	15 3/8	9 1/16	10	9 5/8	8 3/4	7	4 1/4
21 1/2	20 1/4	18 7/8	15	9 1/4	9 1/2	9 1/8	8 1/4	6 5/8	4 1/16
21	20 1/4	18 3/8	14 3/4	9	9	8 3/4	7 7/8	6 1/4	3 7/8
20 1/2	19 7/8	17 15/16	14 3/8	8 3/4	8 1/2	8 1/4	7 3/8	5 15/16	3 5/8
20	19 3/8	17 1/2	14	8 9/16	8	7 5/8	7	5 5/8	3 3/8
19 1/2	18 7/8	17	13 5/8	8 3/4	7 1/2	7 1/4	6 1/2	5 1/4	3 1/4
19	18 1/2	16 1/2	13 1/4	8 1/8	7	6 3/4	6 1/8	4 15/16	3
18 1/2	17 15/16	16 1/8	13	8	6 1/2	6 1/4	5 3/4	4 1/2	2 3/4
18	17 1/2	15 3/4	12 5/8	7 3/4	6	5 7/8	5 1/4	4 3/16	2 9/16
17 1/2	17	15 1/4	12 1/4	7 1/2	5 1/2	5 1/16	4 7/8	3 7/8	2 3/8
17	16 1/2	14 7/8	11 7/8	7 1/4	5	4 7/8	4 3/8	3 1/2	2 1/8
16 1/2	16	14 3/8	11 5/8	7 1/16	4 1/2	4 3/8	3 15/16	3 1/8	1 15/16
16	15 1/2	14	11 3/16	6 7/8	4	3 7/8	3 1/2	2 1/16	1 3/4
15 1/2	15	13 9/16	10 7/8	6 5/8	3 1/2	3 3/8	3 1/16	2 7/16	1 1/2
15	14 1/2	13 1/8	10 1/2	6 1/2	3	2 15/16	2 5/8	2 1/8	1 1/4
14 1/2	14	12 3/4	10 1/8	6 1/4	2 1/2	2 7/16	2 3/16	1 3/4	1 1/8
14	13 1/2	12 1/4	9 3/4	6	2	1 15/16	1 3/4	1 3/8	1
13 1/2	13	11 7/8	9 1/2	5 3/4					

DIAMETERS

OF

BOOMS,

AT THEIR

DIFFERENT QUARTERS,

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER IN THE MIDDLE, IN THE TABLE OF DIMENSIONS.

DRIVER-BOOMS and all others except MAIN-BOOMS.					MAIN-BOOMS					
Diameter in the middle of the Driver-boom, others $\frac{1}{8}$ from the End	Quarters.			Ends.	Diameter at the Sheet	Quarters.			Fore End	Middle.	After End.
	$\frac{40}{41}$ 1st	$\frac{11}{12}$ 2d	$\frac{5}{6}$ 3d	$\frac{2}{3}$		$\frac{40}{41}$ 1st	$\frac{12}{13}$ 2d	$\frac{7}{8}$ 3d	$\frac{2}{3}$	$\frac{11}{12}$	$\frac{3}{4}$
Inches.	In	In	In	In.	In.	In.	In.	In.	In	In	In.
16	15 5/8	14 5/8	13 3/8	10 5/8	16	15 5/8	14 3/4	14	10 5/8	14 5/8	12
15 1/2	15 1/16	14 1/8	13	10 1/4	15 1/2	15 1/16	14 1/4	13 1/2	10 1/4	14 1/8	11 5/8
15	14 5/8	13 3/4	12 1/2	10	15	14 5/8	13 7/8	13 1/8	10	13 3/4	11 1/4
14 1/2	14 1/16	13 1/4	12	9 3/4	14 1/2	14 1/16	13 3/8	12 5/8	9 3/4	13 1/4	10 7/8
14	13 3/4	12 7/8	11 5/8	9 3/8	14	13 3/4	13	12 1/4	9 3/8	12 7/8	10 1/2
13 1/2	13 1/8	12 3/8	11 1/4	9	13 1/2	13 1/8	12 1/2	11 3/4	9	12 3/8	10 1/8
13	12 3/4	11 1/16	10 7/8	8 3/4	13	12 3/4	12	11 3/8	8 3/4	11 1/16	9 1/4
12 1/2	12 1/8	11 1/2	10 7/16	8 1/4	12 1/2	12 1/8	11 9/16	10 7/8	8 1/4	11 1/2	9 3/8
12	11 3/4	11	10	8	12	11 3/4	11 1/16	10 1/2	8	11	9
11 1/2	11 1/8	10 1/2	9 5/8	7 5/8	11 1/2	11 1/8	10 9/16	10	7 5/8	10 1/2	8 5/8
11	10 3/4	10 1/16	9 1/8	7 3/8	11	10 3/4	10 1/8	9 5/8	7 3/8	10 1/16	8 1/4
10 1/2	10 1/4	9 5/8	8 3/4	7	10 1/2	10 1/4	9 11/16	9 1/8	7	9 5/8	7 7/8
10	9 3/4	9 1/8	8 3/8	6 5/8	10	9 3/4	9 1/4	8 3/4	6 5/8	9 1/8	7 1/2
9 1/2	9 1/4	8 3/4	7 1/16	6 1/4	9 1/2	9 1/4	8 3/4	8 1/4	6 1/4	8 3/4	7 1/8
9	8 3/4	8 1/4	7 1/2	6	9	8 3/4	8 5/16	7 7/8	6	8 1/4	6 3/4
8 1/2	8 1/4	7 3/4	7 1/16	5 5/8	8 1/2	8 1/4	7 13/16	7 3/8	5 5/8	7 3/4	6 3/8
8	7 7/8	7 3/8	6 5/8	5 3/8	8	7 7/8	7 3/8	7	5 3/8	7 3/8	6
7 1/2	7 3/8	6 7/8	6 1/4	5							
7	6 7/8	6 3/8	5 7/8	4 3/4							
6 1/2	6 3/8	6	5 7/16	4 3/8							
6	5 7/8	5 1/2	5	4							
5 1/2	5 3/8	5 1/16	4 5/8	3 11/16							
5	4 7/8	4 5/8	4 1/8	3 3/8							
4 1/2	4 3/8	4 1/8	3 3/4	3							
4	3 7/8	3 5/8	3 3/8	2 5/8							
3 1/2	3 7/16	3 1/4	2 11/16	2 1/8							
3	2 11/16	2 3/4	2 1/2	2							

DIAMETERS

OF

GAFFS,

AT THEIR

DIFFERENT QUARTERS,

AS THEY BEAR IN PROPORTION TO THE GIVEN DIAMETER,

IN THE TABLE OF DIMENSIONS.

Diameter Four Feet from the End.	Quarters.			End.
	$\frac{40}{41}$ 1ſt	$\frac{11}{11\frac{1}{2}}$ 2d	$\frac{4}{5}$ 3d	$\frac{5}{9}$
Inches.	Inches.	Inches.	Inches	Inches.
12	$11\frac{3}{4}$	11	$9\frac{5}{8}$	$6\frac{5}{8}$
$11\frac{1}{2}$	$11\frac{1}{8}$	$10\frac{1}{2}$	$9\frac{1}{8}$	$6\frac{3}{8}$
11	$10\frac{3}{4}$	$10\frac{1}{16}$	$8\frac{3}{4}$	$6\frac{1}{8}$
$10\frac{1}{2}$	$10\frac{1}{4}$	$9\frac{5}{8}$	$8\frac{3}{8}$	$5\frac{7}{8}$
10	$9\frac{3}{4}$	$9\frac{1}{8}$	8	$5\frac{9}{16}$
$9\frac{1}{2}$	$9\frac{1}{4}$	$8\frac{3}{4}$	$7\frac{9}{16}$	$5\frac{1}{4}$
9	$8\frac{3}{4}$	$8\frac{1}{4}$	$7\frac{1}{4}$	5
$8\frac{1}{2}$	$8\frac{1}{4}$	$7\frac{3}{4}$	$6\frac{3}{4}$	$4\frac{3}{4}$
8	$7\frac{7}{8}$	$7\frac{3}{8}$	$6\frac{3}{8}$	$4\frac{7}{16}$
$7\frac{1}{2}$	$7\frac{3}{8}$	$6\frac{7}{8}$	6	$4\frac{1}{8}$
7	$6\frac{7}{8}$	$6\frac{3}{8}$	$5\frac{9}{16}$	$3\frac{7}{8}$
$6\frac{1}{2}$	$6\frac{3}{8}$	6	$5\frac{3}{16}$	$3\frac{5}{8}$
6	$5\frac{7}{8}$	$5\frac{1}{2}$	$4\frac{3}{4}$	$3\frac{5}{16}$

A T

R O U G H

MOST SUITABLE FOR

M A S T S, B O W S P

Rough Trees for Maſts, Yards, and Bowſprits, made of

Dimenſions in t

A B L E

OF

T R E E S

THE VARIOUS PARTS OF

R I T S, AND Y A R D S.

ſingle Trees, need not be above Two Inches larger than

he Table of Maſts, &c.

NAMES OF THE MASTS AND YARDS.		100 GUNS.			90 GUNS.		
		Length	Dia.	Numb.	Length	Dia.	Numb.
		Ft. In	Inch		Ft In.	Inch	
Main-Maſt made of Riga Trees.	Spindle . . .	84 0	22½	2	83 0	22	2
	Side-Trees .	77 0	21½	4	76 0	20½	4
	Fiſhes .	94 0	22½	1	92 0	22	1
Main-Maſts made of Two New England Trees.	Lower Tree .	98 0	30½	1	94 0	28½	1
	Upper Tree .	98 0	30	1	94 0	28	1
	Side-Fiſhes .	94 0	26	1	88 0	24	1
Fore-Maſts made of Riga Trees.	Spindle . . .	76 0	22½	2	75 0	22	2
	Side-Trees .	74 0	23	2	73 0	22½	2
	Fiſhes .	80 0	22½	1	78 0	22	1
Fore-Maſts made of Two Riga Trees.	Lower Tree .	—	—	—	—	—	—
	Upper Tree .	—	—	—	—	—	—
	Fiſhes	—	—	—	—	—	—
Mizen-Maſts made of Two Riga Trees.	Lower Tree .	86 0	21	1	84 0	20½	1
	Upper Tree .	86 0	20	1	84 0	20	1
	Fiſhes	84 0	19	1	80 0	18	1
Mizen-Maſts made of One Riga Tree		—	—	—	—	—	—
Bowſprits made of Two Riga Trees.	Main-Trees .	75 0	22½	2	73 0	22	2
	Fore & Aft Fiſhes . .	75 0	23	1	73 0	22½	1
Bowſprit of One New England Tree		—	—	—	—	—	—
Main-Yards made of Two Riga Trees		70 0	26	2	66 0	23	2
Main-Yards of One Ditto		—	—	—	—	—	—
Fore-Yards made of Two Riga Trees		62 0	23	2	58 0	22	2
Fore-Yards of One Ditto		—	—	—	—	—	—

* May be made of Riga Trees

80 GUNS.			74 GUNS.			64 GUNS.			50 GUNS.			44 GUNS.		
Length	Dia.	Numb.	Length	Dia.	Numb.	Length	Dia.	Numb.	Length	Dia	Numb	Length	Dia.	Numb.
Ft. In.	Inch		Ft. In.	Inch		Ft. In	Inch		Ft. In.	Inch		Ft. In.	Inch	
80 0	21½	2	83 0	22	2	78 0	22	2	70 0	18½	2	65 0	18½	2
74 0	20	4	76 0	20½	4	73 0	20	4	68 0	19	2	64 0	18	2
90 0	21½	1	92 0	22	1	81 0	21	1	77 0	19	1	72 0	18½	1
90 0	27½	1	94 0	28½	1	87 0	26	1	78 6	23½	1	*76 0	21½	1
90 0	27	1	94 0	28	1	87 0	25½	1	78 6	23	1	76 0	21	1
84 0	23	1	88 0	24	1	80 0	22½	1	70 6	19½	1	70 0	18	1
70 0	21	2	74 0	21½	2	69 0	19½	2	—	—	—	—	—	—
70 0	22	2	72 0	22	2	67 0	20	2	—	—	—	—	—	—
74 0	22	1	76 0	22½	1	72 0	21	1	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	72 0	21½	1	70 0	19	1
—	—	—	—	—	—	—	—	—	72 0	21	1	70 0	18½	1
—	—	—	—	—		—	—	—	66 0	18½	1	64 0	17	1
80 0	19½	1	82 0	20½	1	76 0	18	1	—	—	—	—	—	—
80 0	19	1	82 0	19½	1	76 0	17½	1	—	—	—	—	—	—
76 0	18	1	80 0	17½	1	74 0	17	1	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	79 0	21	1	75 0	20	1
70 0	22	2	69 0	22	2	62 0	20	2	—	—	—	—	—	—
70 0	22½	1	69 0	22½	1	62 0	20½	1	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	56 0	29½	1	53 0	27	1
64 0	22	2	65 0	23	2	60 0	22	2	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	82 0	21½	1	80 0	21	1
55 0	21	2	57 0	21½	2	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	80 0	21	1	72 0	19½	1	70 0	19	1

if the Length can be obtained to the Diameter.

NAMES OF THE MASTS AND YARDS.	38 GUNS. Length		Dia.	Numb.	36 GUNS. Length		Dia.	Numb.
Main-Maſt made of Riga Trees.	Ft.	In.	Inch		Ft	In.	Inch	
Spindle	67	0	19	1	65	0	19	1
Side-Trees	64	0	18½	2	63	0	18½	2
Fiſhes	72	0	18½	1	70	0	18½	1
Main-Maſts made of Two Riga Trees.								
Lower Tree	80	0	22	1	78	0	21½	1
Upper Tree	80	0	21½	1	78	0	21	1
Fiſhes	80	0	19	1	78	0	18	1
Main-Maſt made of One Riga Tree	—		—	—	—		—	—
Front-Fiſh	—		—	—	—		—	—
Fore-Maſts made of Two Riga Trees.								
Lower Tree	74	0	19½	1	70	0	19½	1
Upper Tree	74	0	19	1	70	0	19	1
Fiſhes	72	0	19	1	68	0	18½	1
Fore-Maſt made of a ſingle Riga Tree	—		—	—	—		—	—
Front-Fiſh	—		—	—	—		—	—
Mizen-Maſts made of One Riga Tree	76	0	21	1	75	0	19½	1
Bowſprits made of One New England Tree	56	0	27	1	55	0	26	1
Bowſprits made of a ſingle Riga Tree	—		—	—	—		—	—
Main Yards made of One Riga Tree	82	0	21	1	79	0	20	1
Fore-Yards made of One Riga Tree	72	0	19	1	70	0	18½	1

32 GUNS				28 GUNS.				24 GUNS.				20 GUNS.				SLOOPS.			
Length		Dia	Numb.	Length		Dia.	Numb.	Length		Dia.	Numb.	Length		Dia.	Numb.	Length		Dia.	Numb.
Ft.	In.	Inch		Ft	In.	Inch		Ft.	In.	Inch		Ft.	In.	Inch		Ft.	In	Inch	
63	0	18	1	62	0	17	1	—		—	—	—		—	—	—		—	—
60	0	17½	2	60	0	17	2	—		—	—	—		—	—	—		—	—
66	0	18	1	62	0	17	1	—		—	—	—		—	—	—		—	—
77	0	20	1	75	0	19½	1	67	0	18½	1	—		—	—	—		—	—
77	0	19½	1	75	0	19	1	67	0	18	1	—		—	—	—		—	—
74	0	18	1	70	0	17½	1	62	0	17	1	—		—	—	—		—	—
—		—	—	—		—	—	—		—	—	72	0	23	1	63	0	20½	1
—		—	—	—		—	—	—		—	—	66	0	17	0½	55	0	16	0½
68	0	18	1	66	0	16½	1	—		—	—	—		—	—	—		—	—
68	0	17½	1	66	0	16	1	—		—	—	—		—	—	—		—	—
66	0	17	1	63	0	16½	1	—		—	—	—		—	—	—		—	—
—		—	—	—		—	—	67	0	21½	1	64	0	21	1	56	0	19	1
—		—	—	—		—	—	60	0	17½	0½	58	0	16	0½	52	0	15	0½
72	0	19	1	69	0	19	1	64	0	17	1	61	0	16	1	48	0	14	1
53	0	25	1	—		—	—	—		—	—	—		—	—	—		—	—
—		—	—	49	0	24½	1	46	0	23	1	44	0	22	1	38	0	19	1
75	0	20	1	72	0	19	1	66	0	18	1	63	0	16	1	56	0	15	1
65	0	18	1	62	6	17	1	58	0	16	1	55	0	14	1	49	0	13½	1

METHOD

OF

MEASURING ROUGH TREES

FOR

MASTS.

WHEN rough trees are delivered into the King's Yards for the uſe of the navy, the following are the rules by which they are received. As they are paid for according to their ſize, it is evident that ſome regulations with reſpect to the proportion of breadth to length muſt exiſt. Accordingly, therefore, as the breadths bear proportion to the length, by the following method, they are denominated and paid for.

The length of the maſt to be three times, in feet, what the diameter is in inches at the partners, adding thereto nine feet.

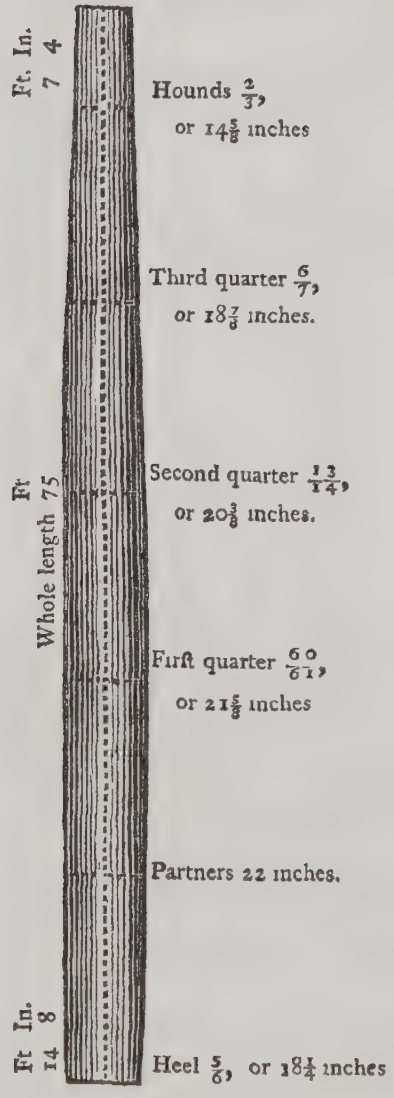
The meaſuring-place for the partners is at $\frac{2}{7}$, in feet, from the butt, what the maſt meaſures, in inches, at the partners.

The hounds (or upper meaſuring-place) are to be ſet back from the whole length, $\frac{1}{2}$ of the diſtance from the butt to the partners.

From the hounds to the partners is to be divided into four equal parts, called quarters. The ſeveral quarters, the hounds, and the heel, or butt, muſt bear the following proportions to the diameter at the partners, *viz.* Firſt quarter, (or that next the partners,) $\frac{60}{61}$, ſecond quarter, $\frac{13}{14}$; third quarter, $\frac{6}{7}$, hounds, $\frac{2}{3}$; and heel, $\frac{5}{6}$.

Rough trees for maſts ſhould not be knotty; as, in that caſe, they can only ſerve for ſpindles, and not come in for top-maſts, &c.

To illuſtrate this, obſerve the following ſketch of a 22-inch rough Riga maſt.



Suppoſe the whole length to be 75 feet. Then the diameter, at the partners, muſt be 22 inches; becauſe 3 times that diameter, in feet, with the addition of 9 feet, as before-obſerved, makes 75. The length from the heel to the partners, $\frac{2}{3}$ of 22 inches, in feet, $=$ 14 feet 8 inches. The length from the head to the hounds, $\frac{1}{2}$ the length of the partners from the butt, $=$ 7 feet 4 inches.

HAND-

HAND-MASTS are, in their proportions, governed by their reſpective diameters at the partners; which are required in the following proportions to the hands in circumference.

Hands.	Hands in circumference ſhould have	Inches.	Inches in diameter at the partners.
16		20	
15½		18 7/8	
15		18 3/4	
14½		17 5/8	
14		17 1/2	
13½		16 3/8	
13		16 1/4	
12½		15 1/8	
12		15	
11½		14 3/8	
11		13 3/4	
10½		12 5/8	
10		12 1/2	
9½		11 3/8	
9		11 1/4	
8½		10 1/8	
8		10	
7½		8 7/8	
7		8 3/4	
6½		7 5/8	
6		7 1/2	

The diſtance of the partners from the butt is 8 inches for every hand in circumference at the partners: thus, if 6 hands circumference at the partners, the diſtance of the partners is 48 inches.

In the middle, between the partners and the top, the diameter is $\frac{11}{12}$ of that at the partners. The top is $\frac{2}{3}$ of the diameter of the partners.

To find the whole length, multiply the number of hands in circumference at the partners by 3, and add 18 feet; the anſwer is in feet and inches. Thus, the circumference at the partners being 16 hands,

Multiply by 3

48

And add . . 18

66 feet in length.

Obſerve, 4 inches make a hand.

BOWSPRITS are to be, in length, $\frac{2}{3}$, in yards, what their diameter, at the bed, or meaſuring-place, is in inches. The bed is $\frac{2}{3}$, in feet, from the butt, what the bowſprit is intended to meaſure there in inches.

MASTS from *America* are moſtly trimmed in that country nearly to their ſizes, ſo that the diameter and length, as per Table, is ſufficient.

YARDS ſhould be, in length, as per Table; and hold that diameter in the middle, and half that diameter at the ends.

VALUE

VALUE

OF

WORKMANSHIP,

PER FOOT IN LENGTH,

FOR PUTTING TOGETHER AND COMPLETING

MASTS, YARDS, BOWSPRITS, BOOMS, *&c.*

IN THE

ROYAL NAVY.

NAMES OF THE MASTS, YARDS, &c.	Guns. 110 to 100.		Guns. 98 to 90.		Guns. 80.		G
	s.	d.	s.	d.	s.	d.	s.
Main-maſt, in parts	17	0	16	0	15	0	1
Foie-maſt, in parts	15	0	14	0	14	0	1
Mizen-maſt, in parts	10	0	9	9	9	0	
Mizen-maſt, lengthened	3	6	3	6	3	5	
Bowſprit, in parts	9	0	8	10	8	9	
Main-maſt, ſingle tree	—		—		—		
Fore-maſt, ſingle tree	—		—		—		
Mizen-maſt, ſingle tiee	—		—		—		
Bowſprit, ſingle tiee	—		—		—		
Main-yard, in parts	3	8	3	6	3	4	
Fore-yard, in parts	3	8	3	6	3	4	
Main-yaid, lengthened	—		—		—		
Fore-yard, lengthened	2	0	1	10	1	8	
Mizen-yaid, lengthened	1	0	1	0	1	0	
Top-maſt. Main	1	11	1	10½	1	10	
Top-maſt. Fore	1	11	1	10½	1	10	
Top-maſt. Mizen	1	0	0	11	0	11	
Top-gallant-maſt. Main	0	8	0	8	0	8	
Top-gallant-maſt. Foie	0	8	0	8	0	8	
Top-gallant-maſt. Mizen	0	6	0	6	0	6	
Royal-maſt. Main	0	6	0	6	0	6	
Royal-maſt. Fore	0	6	0	6	0	6	
Yards. Main	—		—		—		
Yards. Fore	—		—		—		
Yards. Mizen	—		—		—		

FOR SHIPS FROM 110 TO 14 GUNS.

UNS. 74.		GUNS. 64.		GUNS 50.		GUNS. 44.		GUNS. 38.		GUNS. 36.		GUNS. 32.		GUNS. 28.		GUNS. 24.		GUNS. 20.		GUNS 18 to 14.	
,	*d*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
3	3	13	6	12	6	12	0	12	0	11	6	10	6	9	6	9	0	8	6	7	6
3	4	12	6	11	8	10	0	10	0	10	0	8	6	7	9	7	0	—	—	—	—
3	0	7	6	7	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	4	3	0	2	10	2	7	2	7	2	7	2	6	2	4	2	0	—	—	—	—
3	8	8	6	8	2	7	10	7	10	7	6	7	0	6	0	—	—	—	—	—	—
—	—	5	3	5	0	4	10	4	10	4	10	4	8	4	6	4	0	3	8	3	0
—	—	4	10	4	10	4	8	4	8	4	6	4	4	4	0	3	6	3	4	2	10
—	—	2	10	2	8	2	5	2	5	2	5	2	4	2	2	1	10	1	10	1	9
—	—	3	0	3	0	3	0	3	0	2	10	2	6	2	4	2	3	2	0	2	0
3	4	3	0	2	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	4	3	0	2	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	1	6	1	4	1	0	1	0	1	0	0	10	0	10	0	9
1	8	1	7	1	6	1	4	1	0	0	11	0	11	0	11	0	10	0	10	0	9
1	0	0	10	0	10	0	9	0	8	0	8	0	7	0	7	0	6	0	6	0	5
1	10	1	9	1	7	1	6	1	6	1	6	1	6	1	6	1	4	1	4	1	3
1	10	1	9	1	7	1	6	1	6	1	6	1	6	1	6	1	4	1	4	1	3
0	10½	0	10½	0	10	0	9	0	9	0	9	0	9	0	9	0	8	0	8	0	7
0	7	0	7	0	6½	0	6	0	6	0	5	0	5	0	5	0	4	0	4	0	4
0	7	0	7	0	6½	0	6	0	6	0	5	0	5	0	5	0	4	0	4	0	4
0	5½	0	4½	0	4	0	3½	0	3½	0	3½	0	3	0	3	0	2½	0	2	0	2
0	5½	0	4½	0	4	0	3½	0	3½	0	3½	0	3	0	3	0	2½	0	2	0	2
0	5½	0	4½	0	4	0	3½	0	3½	0	3½	0	3	0	3	0	2½	0	2	0	2
—	—	—	—	—	—	1	4	1	2	0	10	0	10	0	10	0	9	0	9	0	8
—	—	1	5	1	4	1	2	0	10	0	9½	0	9½	0	9½	0	9	0	9	0	8
—	—	0	9	0	9	0	8	0	7	0	7	0	6	0	6	0	5	0	5	0	4

Topſail-yards . . .	Main	1	0	1	0	1	0
	Fore	1	0	0	11	0	11
	Mizen	0	8	0	8	0	8
Top-gallant-yards	Main	0	6	0	6	0	6
	Fore	0	6	0	6	0	6
	Mizen	0	5	0	5	0	5
Royal-yards . . .	Main	0	5	0	5	0	5
	Fore	0	4	0	4	0	4
	Mizen	0	2	0	2	0	2
Croſs-jack-yard		1	0	0	11	0	11
Spritſail-yard		1	0	0	11	0	11
Spritſail-topſail-yard		0	6	0	6	0	6
Driver-yard		0	5	0	5	0	5
Flying jib-boom		1	0	0	11	0	11
Driver-boom, with jaws		1	2	1	1	1	1
Driver-boom, without jaws		0	8	0	8	0	8
Gaff							
Lower ſtuddingſail-booms, each		0	5	0	5	0	5
Topmaſt ſtuddingſail-booms		0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$
Topgallant-ſtuddingſail-booms		0	4	0	4	0	4
Lower ſtuddingſail-yards		0	3	0	3	0	3
Topmaſt ſtuddingſail-yards		0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$
Topgallant-ſtuddingſail-yards		0	2	0	2	0	2
Fire-boom		0	7	0	$6\frac{1}{2}$	0	6
Enſign-ſtaff		0	6	0	$5\frac{1}{2}$	0	$5\frac{1}{2}$
Jack-ſtaff		0	3	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$
Wedging maſts in the partners, per wedge	Main and fore.	2	6	2	6	2	6
	Mizen	2	0	2	0	2	0
LONG-BOATS'	Maſts	0	7	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$
	Bowſprits	0	$4\frac{1}{2}$	0	4	0	4
Mainſail-boom		0	$4\frac{1}{2}$	0	4	0	4
Mainſail-gaff		0	7	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$
Topmaſts, each		0	$5\frac{1}{2}$	0	5	0	5

0	11	0	10	0	9	0	8	0	8	0	8	0	8	0	8	0	7	0	6	0	6
0	10½	0	10	0	9	0	8	0	8	0	8	0	8	0	8	0	7	0	6	0	6
0	7	0	6	0	6	0	6	0	6	0	6	0	5½	0	5½	0	5	0	4	0	4
0	6	0	5	0	5	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	3
0	5½	0	5	0	4½	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	3
0	4½	0	3½	0	3½	0	3	0	3	0	3	0	2½	0	2½	0	2	0	2	0	2
0	4½	0	3½	0	3½	0	3	0	3	0	3	0	2½	0	2½	0	2	0	2	0	2
0	3½	0	3	0	3	0	2½	0	2½	0	2½	0	2	0	2	0	2	0	2	0	2
0	2	0	2	0	1½	0	1½	0	1½	0	1½	0	1½	0	1½	0	1	0	1	0	1
0	10½	0	10	0	9	0	8	0	8	0	8	0	8	0	8	0	7	0	6	0	6
0	10½	0	10	0	9	0	8	0	8	0	8	0	8	0	8	0	7	0	6	0	6
0	5½	0	5	0	4½	0	4	0	4	0	4	0	4	0	4	0	4	0	3½	0	3½
0	5	0	5	0	4½	0	4½	0	4½	0	4½	0	4½	0	4½	0	4	0	4	0	4
0	11	0	10	0	9	0	8	0	8	0	7	0	6	0	5	0	5	0	4	0	4
1	0	0	11	0	10	0	9½	0	9	0	9	0	9	0	8	0	7	0	6	0	6
0	8	0	7	0	5½	0	4½	0	4	0	4	0	4	0	4	0	3½	0	3	0	3
						1	0	0	11	0	11	0	11	0	10	0	10	0	9	0	9
0	4½	0	4½	0	4	0	3½	0	3½	0	3½	0	3½	0	3½	0	3½	0	3	0	3
0	4½	0	4	0	3½	0	3	0	3	0	3	0	3	0	3	0	3	0	2½	0	2½
0	4	0	3½	0	3	0	2½	0	2½	0	2½	0	2½	0	2½	0	2	0	2	0	2
0	3	0	2½	0	2½	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2
0	2½	0	2	0	2	0	1½	0	1½	0	1½	0	1½	0	1½	0	1½	0	1½	0	1½
0	2	0	1½	0	1½	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
0	6	0	6	0	5½	0	5½	0	4½	0	4	0	3½	0	3½	0	2½	0	2½	0	2½
0	5	0	5	0	4½	0	4½	0	4	0	4	0	4	0	3½	0	3½	0	3	0	3
0	2½	0	2½	0	2	0	2	0	2	0	2	0	2	0	2	0	1½	0	1½	0	1½
2	6	2	6	2	6	2	6	2	6	2	6	2	6	2	6	2	6	2	6	2	6
2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
0	6	0	5½	0	5	0	4½	0	4	0	3½	0	3	0	3	0	3	0	3	0	3
0	4	0	4	0	3½	0	3½	0	3½	0	3	0	3	0	3	0	2½	0	2½	0	2
0	4	0	4	0	3½	0	3½	0	3½	0	3	0	3	0	3	0	2½	0	2½	0	2
0	6	0	5½	0	5	0	4½	0	4	0	3½	0	3	0	3	0	3	0	3	0	3
0	4	0	4	0	3½	0	3	0	3	0	2½	0	2	0	2	0	2	0	2	0	2

NAMES OF THE MASTS, YARDS, &c.	Guns 110 to 100.		Guns. 98 to 90.		Guns. 80.		Gu 7
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*
Small boats' maſts	0	3½	0	3	0	3	0
Topmaſts	0	2	0	2	0	2	0
Yards, ſpritſ, and outriggers	0	1¼	0	1¼	0	1¼	0
Boat-hook-ſtaves	0	1	0	1	0	1	0

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MAKING OF TH

Lower-caps, in two pieces		4	7	4	6	4	5	4
Lower-caps, in one piece		3	7	3	6	3	5	3
Topmaſt	Caps, each	3	0	3	0	2	11	2
	Croſs-trees, each	2	6	2	6	2	5	2
	Cheek-blocks	1	0	1	0	1	0	1
Half davits		0	8	0	7½	0	7	0
Wood buoys		0	3	0	3	0	3	0

PS FROM 110 TO 14 GUNS, CONTINUED.

NS. 1.	GUNS. 64.		GUNS. 50.		GUNS. 44.		GUNS. 38.		GUNS. 36.		GUNS 32.		GUNS. 28.		GUNS. 24.		GUNS. 20.		GUNS. 18 to 14.	
d.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2
$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$
$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$
1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

ARTICLES

ICH ARE

NDER IN ADDITION

'O THE

E MASTS, YARDS, &c.

4	4	3	4	2	4	1	4	0	3	11	3	10	3	9	3	8	3	7	3	6
4	3	3	3	2	3	1	3	0	2	11	2	10	2	9	2	8	2	7	2	6
10	2	9	2	8	2	7	2	6	2	5	2	4	2	3	2	2	2	1	2	0
5	2	4	2	4	2	3	2	3	2	2	2	2	2	1	2	1	2	0	2	0
0	1	0	0	11	0	11	0	11	0	10	0	10	0	10	0	9	0	9	0	9
7	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$	0	6	0	6	0	$5\frac{1}{2}$	0	5	0	5	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	4
3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3

	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
Tennon the heel of the lower maſts and bowſprit	1	14	0	1	14	0	1	13	0
Cut out the holes in the main, fore, and mizen, ſteps	1	5	6	1	5	0	1	4	6
Faſten the fiſh-fillings, treſtle-trees, and bolſters, and drive on the hoops over the fiſhes of the main-maſt	3	0	0	2	18	0	2	17	0
Ditto fore-maſt	2	15	0	2	14	0	2	13	6
Faſten treſtle-trees and bolſters to the mizen-maſt	0	11	6	0	11	4	0	11	0
Faſten the bees, ſaddles, cap, bee-blocks, and rings, to bowſprit	0	13	0	0	12	6	0	12	6
Cut out the ſtep in the partners, trim and lead the bed, and cut out the holes in the deck for the bowſprit	2	17	0	2	16	6	2	16	0
Leather the round holes in the fore, main, and mizen, lower caps	0	8	6	0	8	0	0	8	0
To cut out fid and ſheave holes; fit treſtle-trees, croſs-trees, cap and check block, to main-topmaſt	2	2	0	2	0	0	1	19	0
Ditto fore-topmaſt	2	0	0	1	18	0	1	18	0
Ditto mizen-topmaſt	0	19	0	0	18	0	0	17	0
Fix on boom-irons, batten and cleat the main-yard	1	12	0	1	9	0	1	8	0
Ditto fore-yard	1	12	0	1	9	0	1	8	0
Cut out ſheave-holes, drive on hoops and eye-bolts, to mizen-yards	0	5	4	0	5	2	0	5	0
Cut out ſheave-holes, batten and cleat, let on hoops, drive eye-bolts, and copper the ſheave-holes of main, fore, and mizen, topſail-yards	1	2	0	1	2	0	1	1	0
Cleat the ſpritſail and croſs-jack yards	0	2	0	0	2	0	0	2	0

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d
1	13	0	1	12	0	1	10	0	1	8	0	1	8	0	1	8	0	1	6	0	1	6	0	1	2	0	1	2	0	1	2	0
1	4	6	1	3	6	1	2	0	1	0	0	1	0	0	1	0	0	0	18	6	0	18	6	0	17	0	0	17	0	0	17	0
2	16	0	2	13	6	2	9	6	2	6	0	2	6	0	2	6	0	2	1	0	2	1	0	1	16	6	1	16	6	1	16	6
2	13	0	2	10	6	2	7	0	2	2	0	2	2	0	2	2	0	1	18	0	1	18	0	1	13	0	1	13	0	1	13	0
0	11	0	0	10	6	0	9	0	0	8	0	0	8	0	0	8	0	0	7	6	0	7	6	0	7	0	0	7	0	0	7	0
0	12	6	0	12	0	0	11	6	0	10	6	0	10	6	0	10	6	0	10	0	0	10	0	0	8	6	0	8	6	0	8	6
2	16	0	2	14	0	2	11	0	2	7	6	2	7	6	2	7	6	2	3	0	2	3	0	1	16	0	1	16	0	1	16	0
0	8	0	0	7	6	0	7	0	0	6	6	0	6	6	0	6	6	0	6	0	0	6	0	0	5	0	0	5	0	0	5	0
1	19	0	1	17	0	1	15	0	1	11	0	1	11	0	1	11	0	1	9	0	1	9	0	1	5	0	1	5	0	1	5	0
1	17	0	1	16	0	1	12	0	1	9	0	1	9	0	1	9	0	1	7	0	1	7	0	1	4	0	1	4	0	1	4	0
0	17	0	0	16	0	0	15	0	0	14	0	0	14	0	0	14	0	0	14	0	0	14	0	0	12	0	0	12	0	0	12	0
1	8	0	1	6	0	1	2	0	1	0	0	1	0	0	1	0	0	0	19	0	0	19	0	0	16	0	0	16	0	0	16	0
1	8	0	1	6	0	1	2	0	1	0	0	1	0	0	1	0	0	0	19	0	0	19	0	0	16	0	0	16	0	0	16	0
0	5	0	0	4	8	0	4	3	0	4	0	0	4	0	0	4	0	0	3	8	0	3	8	0	3	4	0	3	4	0	3	4
1	1	0	1	0	0	0	19	0	0	17	0	0	17	0	0	17	0	0	16	0	0	16	0	0	14	0	0	14	0	0	14	0
0	2	0	0	1	10	0	1	9	0	1	8	0	1	8	0	1	8	0	1	6	0	1	6	0	1	5	0	1	5	0	1	5

NAMES OF THE MASTS, YARDS, &c.	Guns. 110 to 100.			Guns. 98 to 90.			Guns. 80.			C
	l.	*s.*	*d*	*l.*	*s.*	*d.*	*l.*	*s.*	*d*	*l.*
Hollow, bolt, and wedge, the chock to bowſprit	1	0	0	0	19	6	0	19	0	0
Bolt and belay the croſs-trees	0	5	0	0	5	0	0	5	0	0
Bore off and bolt the tops	0	7	6	0	7	3	0	7	0	0
Shoar the caps	0	5	3	0	5	0	0	4	9	0
Trim and faſten cleats to the maſt-heads for the jeer-blocks	0	2	0	0	2	0	0	2	0	0
Fix top-rollers with iron cleats	0	6	6	0	6	6	0	6	6	0
Faſten cheek-blocks to topmaſt-head	0	3	8	0	3	8	0	3	6	0
Trim and faſten rubbing-paunch to the foie-maſt	0	7	6	0	7	0	0	6	9	0
Copper the mizen-maſt in the way of the boom	0	5	0	0	5	0	0	5	0	0
Trim and faſten ſaddles to maſt for the boom	0	5	3	0	5	3	0	5	0	0

)N TO THE VALUE OF WORKMANSHIP, CONTINUED.

;UNS. 74.			GUNS 64.			GUNS. 50.			GUNS. 44.			GUNS. 38.			GUNS. 36.			GUNS 32.			GUNS. 28.			GUNS. 24.			GUNS. 20.			GUNS. 18 to 14.		
s.	*d.*		*l.*	*s.*	*d.*	*l.*	*s.*	*d*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d*	*l.*	*s.*	*d*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
18	6	0	16	6	0	15	0	0	13	6	0	13	6	0	13	6	0	12	0	0	12	0	0	10	6	0	10	6	0	10	6
5	0	0	4	8	0	4	6	0	4	4	0	4	4	0	4	4	0	4	2	0	4	2	0	3	6	0	3	6	0	3	6
7	0	0	6	6	0	6	0	0	5	6	0	5	6	0	5	6	0	5	3	0	5	3	0	4	6	0	4	6	0	4	6
4	9	0	4	9	0	3	8	0	3	6	0	3	6	0	3	6	0	3	4	0	3	4	0	3	2	0	3	2	0	3	2
2	0	0	2	0	0	1	10	0	1	9	0	1	9	0	1	9	0	1	6	0	1	6	0	1	4	0	1	4	0	1	4
6	6	0	6	6	0	6	0	0	5	6	0	5	6	0	5	6	0	5	2	0	5	2	0	4	9	0	4	9	0	4	9
3	6	0	3	6	0	3	6	0	2	9	0	2	9	0	2	9	0	2	6	0	2	6	0	2	4	0	2	4	0	2	4
6	9	0	6	3	0	6	0	0	5	3	0	5	3	0	5	3	0	4	6	0	4	6	0	4	3	0	4	3	0	4	3
5	0	0	4	6	0	4	4	0	4	0	0	4	0	0	4	0	0	3	9	0	3	9	0	3	6	0	3	6	0	3	6
5	0	0	4	6	0	4	4	0	4	2	0	4	2	0	4	2	0	4	0	0	4	0	0	3	4	0	3	4	0	3	4

NAMES OF THE MASTS, YARDS, &c.	Tons. 250.
	s. d.
Main-maſt, in parts	6 6
Main-maſt, ſingle tree	2 4
Main-maſt, ſingle tree, with oak cheeks	3 0
Mizen-maſt, ſingle tree	0 9
Bowſprit, ſingle tree	2 2
Top-maſt	1 3
Mizen-yard	0 4
Main-topſail-yards	0 7
Main-top-gallant-yard	0 4
Croſs-jack-yard	0 6
Flying jib-boom	0 4
Driver-boom with jaws	0 5
Studdingſail-booms, each	0 3
Studdingſail-yards	0 2
Enſign-ſtaff	0 3
Jack-ſtaff	0 1
Wedging maſts in the partners, per wedge	1 0
Square-ſail-yard	0 4
Out-rigger	0 4
Mainſail-boom	0 10
Squareſail-boom	0 7
Mainſail and tryſail gaffs	0 10

[IP, FOR CUTTERS AND SLOOPS.

Tons. 230.		Tons. 200.		Tons. 180.		Tons. 160.		Tons. 140.		Tons. 120.		Tons. 100.		Tons. 80.	
s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
6	0	5	9	5	6	5	3	5	0						
2	2	2	0	1	10	1	8	1	6	1	4	1	0	0	9
2	9	2	6	2	4	2	3	2	2	2	0	1	10	1	8
0	8	0	$7\frac{1}{2}$	0	7	0	$6\frac{1}{2}$	0	6	0	$5\frac{1}{2}$	0	5	0	4
2	0	1	10	1	8	1	6	1	4	1	2	0	10	0	8
1	2	1	1	1	0	0	11	0	10	0	9	0	8	0	7
0	4	0	4	0	4	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	3	0	3	0	$2\frac{1}{2}$
0	7	0	$6\frac{1}{2}$	0	6	0	$5\frac{1}{2}$	0	5	0	$4\frac{1}{2}$	0	4	0	$3\frac{1}{2}$
0	4	0	4	0	4	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	3	0	3	0	$2\frac{1}{2}$
0	6	0	6	0	$5\frac{1}{2}$	0	5	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	4	0	4
0	4	0	4	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	3	0	3	0	3
0	5	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	4	0	4	0	4	0	3
0	3	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	2	0	2	0	2	0	2	0	2
0	2	0	2	0	2	0	2	0	2	0	$1\frac{1}{2}$	0	1	0	1
0	3	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	2	0	2	0	2	0	2
0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	1	0	1	0	1	0	1
1	0	0	$11\frac{1}{2}$	0	$10\frac{1}{2}$	0	$9\frac{1}{2}$	0	9	0	$8\frac{1}{2}$	0	8	0	8
0	4	0	4	0	4	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	3	0	3	0	3
0	4	0	3	0	3	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	2	0	2	0	2
0	10	0	10	0	9	0	9	0	9	0	8	0	8	0	7
0	7	0	7	0	6	0	6	0	6	0	5	0	4	0	4
0	10	0	10	0	9	0	9	0	9	0	8	0	8	0	7

AN ESTIMATE OF *PARTS OF THE WORK* IN MAKING LOWER-MASTS AND TOPMASTS.

When the principal pieces of a made maſt are put together, ſo as completely to form two ſides of the maſt, ready for raiſing the coaks for the ſide-fiſhes, the maſt is one-fourth done.

When the ſide-fiſhes and angle pieces are on, and the maſt planed up ready for raiſing the coaks for the cheeks, each made of two pieces, the maſt is three-fifths done

If the cheeks of the maſt are made each cheek of one piece and added to the former, the maſt is two-thirds done.

If the cheeks, treſtle-trees, croſs-trees, and cap, are provided or ſerve again from a former maſt, the maſt is one-ſixth done.

The cheeks ready for letting on are reckoned one-ninth of the maſt.

The treſtle-trees, croſs-trees, and cap, may be reckoned one-eleventh of the maſt.

A maſt, made of a ſingle tree, ready for cheeking is two-fifths done.

Making of topmaſts, if the croſs-trees, cap, and cheek-blocks, are provided or ſerve again, the topmaſt is one-fourth done.

A TABLE OF THE VAL

MASTS OF RIGA OR GOTTENBOROUGH					NORWAY HAND-MASTS.					N
Diam.	Length	Value.			Hands in Circumf.	Diam. in In.	Length	Value.		Dia in I
Inches.	Ft. In.	£.	s.	d.	Hands.	Inches	Ft. In.	£.	s. d	Inch
26	87 0	94	14	5	16	20	66 0	30	0 0	3
25½	85 6	89	19	4	15½	18 7/8	64 6	12	0 0	3
25	84 0	85	4	3	15	18¾	63 0	11	0 0	3
24½	82 6	77	6	4½	14½	17 5/8	61 6	10	0 0	3
24	81 0	69	8	6	14	17½	60 0	9	0 0	3
23½	79 6	62	12	1½	13½	16 3/8	58 6	8	5 0	3
23	78 0	55	15	9	13	16¼	57 0	7	10 0	3
22½	76 6	51	11	5½	12½	15⅛	55 6	6	15 0	3
22	75 0	47	7	2	12	15	54 0	6	0 0	3
21½	73 6	41	11	9	11½	14⅜	52 6	5	7 6	2
21	72 0	35	16	9	11	13¾	51 0	4	15 0	2
20½	70 6	30	17	6	10½	12⅝	49 6	4	2 6	2
20	69 0	25	18	8	10	12½	48 0	3	10 0	2
19½	67 6	22	11	5½	9½	11⅜	46 6	2	17 6	2
19	66 0	19	4	3	9	11¼	45 0	2	5 0	2
18½	64 6	17	6	0½	8½	10⅛	43 6	1	18 6	2
18	63 0	15	7	10	8	10	42 0	1	12 0	2
17½	61 6	13	14	0	7½	8⅞	40 6	1	9 6	2
17	60 0	12	0	0	7	8¼	39 0	1	7 0	2
16½	58 6	11	10	10½	6½	7⅝	37 6	0	19 6	1
16	57 0	11	1	7	6	7½	36 0	0	12 0	1

BOWSPRITS of Riga or Gottenborough tre

The DUTY, per maſt, 6 inches in diameter and under 12 inches and upwards, 10s. per load. —

UE OF FIR TIMBER, 1792.

MASTS OF ORTH AMERICA WHITE PINE.					BOWSPRITS OF NORTH AMERICA WHITE PINE.					YARDS OF NEW ENGLAND.				
m. n.	Length in Yds.	Value.			Diam. in In	Length in Yds	Value.			Diam in In.	Length in Yds	Value.		
es.	Yards.	£.	s.	d.	Inches.	Yards.	£.	s.	d.	Inches.	Yards.	£.	s.	d.
8	38	190	1	0	38	25	108	12	0	25	35	62	0	0
7	37	174	4	0	37	24½	96	16	0	24½	34½	55	0	0
6	36	153	2	0	36	24	88	10	0	24	34	48	16	0
5	35	134	12	0	35	23½	72	3	0	23½	33	43	19	0
4	34	120	2	0	34	23	64	4	0	23	32	39	12	0
3	33	102	19	0	33	22½	58	1	0	22½	31½	35	17	0
2	32	89	2	0	32	21¾	53	4	6	22	31	31	13	0
1	31	79	17	0	31	21	48	16	0	21½	30	27	18	0
0	30	69	6	0	30	20½	44	12	6	21	29½	24	8	0
9	29	54	15	0	29	19½	34	15	0	20½	28½	22	12	0
8	29	50	16	0	28	19	29	9	0	20	28	20	9	0
7	29	46	17	0	27	18½	25	19	6	19½	27½	18	12	0
6	28	41	11	0	26	17¾	22	0	0	19	27	16	10	0
5	27	36	6	0	25	17	19	7	0	18½	26	13	17	0
4	27	32	6	0	24	16½	16	14	0	18	25½	12	10	0
3	27	29	14	0	23	16	14	1	0	17½	25	11	8	0
2	26	23	2	0	22	15	12	5	6	17	24½	10	11	0
1	25	20	9	0	21	14½	11	0	0	16½	23½	9	13	0
0	24	16	10	0	20	13¾	10	1	6	16	22½	8	16	0
9	23	13	7	0	19	13	9	13	0	—	—	—		
8	23	12	10	0	18	12½	8	16	0	—	—	—		

es are $\frac{2}{3}$ of the value of masts of the same diameter.

8 inches, is 1*s.* 1½*d.* — 8 inches and under 12, 3*s.* 4*d.* — and

· Fifty cubic feet of fir, oak, or elm, make a load.

THE VALUE OF A

NAMES.	SIZE OR THICKNESS.	LENGT
Cant ſpars . . .	7 to 5 inches, at 3 feet 4 inches from the butt	36 to 33
Ratling ſpars .	5 to 4 inches, at 2 feet 8 inches from the butt	30 to 28
Boom ſpars . .	4 to 3 inches, at 2 feet from the butt	30 to 27
Middling ſpars	3 to 2 inches	—
Small ſpars . .	2 inches and under	—

THE VALUE OF AND DU

	£.	s.
Straight oak, per load	3	5
Elm, per load	3	0
Dantzic fir, per load	2	7
Load baulk, per load	2	0
Pruſſia deals, 3 inches thick, each	0	17
Medium Pruſſia, 2½ inches thick, each	0	15
Pruſſia deals, 2 inches thick, each	0	10

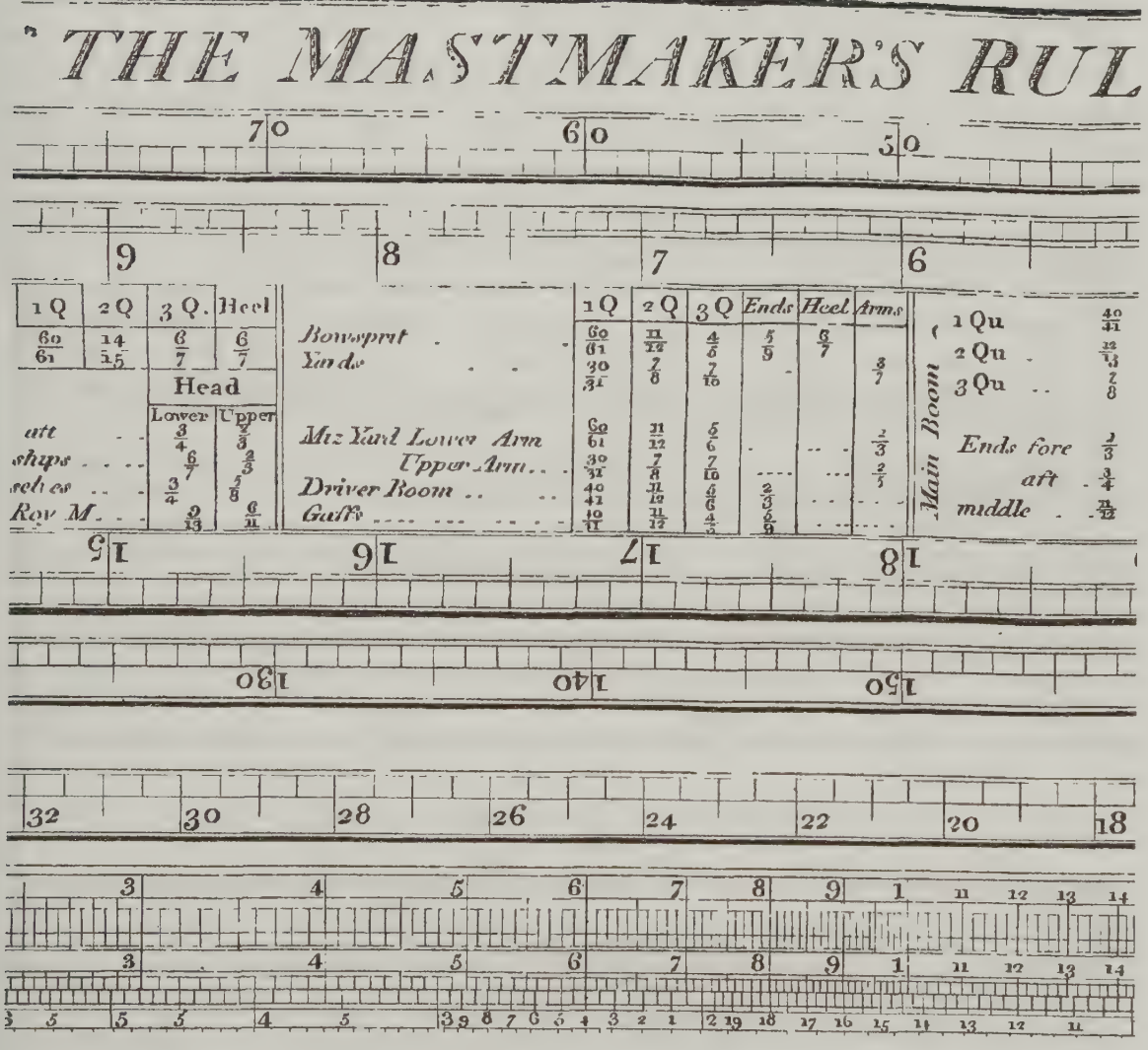
AND DUTY ON SPARS.

H.	VALUE.	DUTY ON 120 SPARS.		
	£. s. d.	*Length.*	*Diameter.*	£. s. d.
feet	0 6 6 each.			
feet	0 3 10 each.	Under 22 feet, and	under 4 inches	0 6 8
feet	0 3 2 each.	22 feet and upwards	under 4 inches	0 11 0
	3 10 0 per 100.	22 feet and upwards	4 inches and under 6	1 4 3
	2 3 0 per 100.			

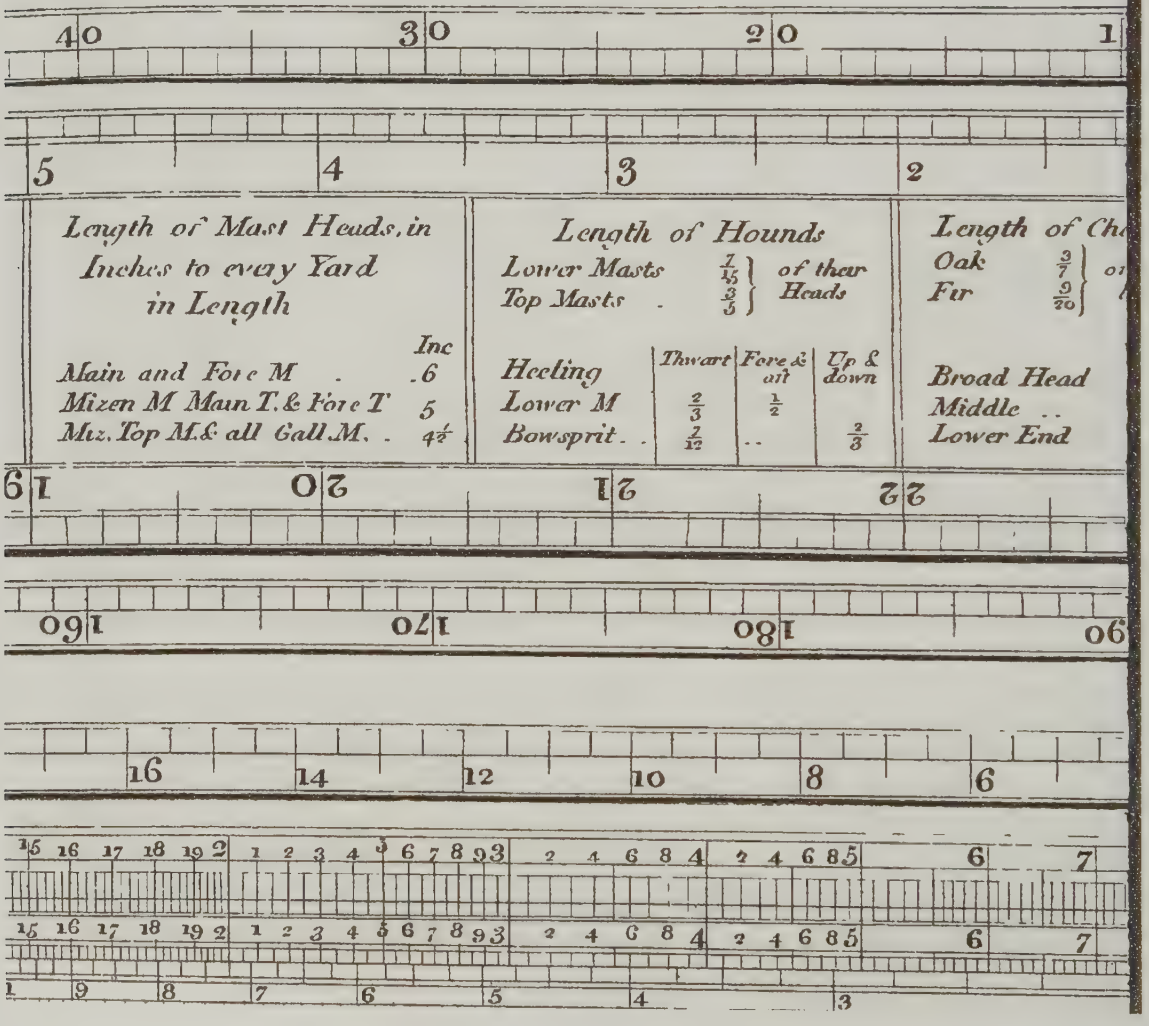
JTY ON TIMBER, PER LOAD.

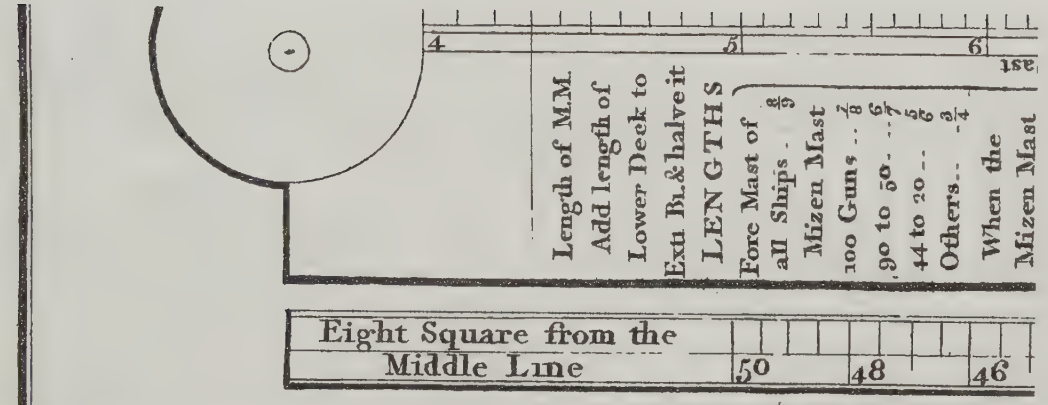
d.		£. s. d.
0	Ordinary deals, 13 feet 6 inches long, per dozen	1 3 3
0	Ordinary deals, 11 feet 6 inches long, per dozen	0 19 3
0	Ordinary deals, 9 feet 6 inches long, per dozen	0 17 3
0		
6	The DUTY on timber 8 inches square and upwards is 10s. 6d. per load.	
0		
6	IRON WORK to MASTS, &c. materials and workmanship, is £1 17 6 per cwt.	

100
90
80
11
10
Fractional Proportions of Masts &c as they bear to the given diameter at the Partners
Lower M Top M
Gall M & Roy M
M cheeked rove &
M cheeked thwart
M that head them
Top M Gall M &
13
14
110
120
Edge 40
38
36
34
1
1
2
2
10 5 9 5 8 5 7 5

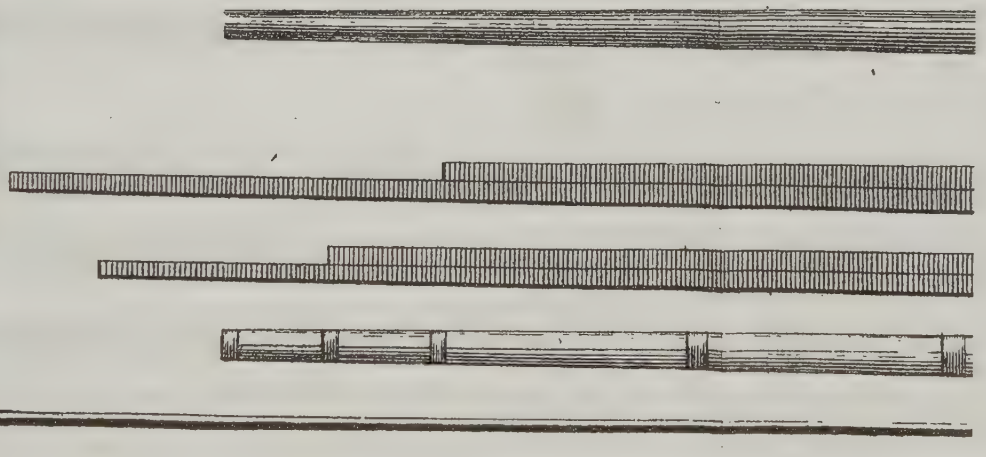

THE MAST MAKER'S RUL
1 Q
2 Q
3 Q.
Heel
Head
Lower
Upper
Bowsprit
Yards
Mizen Yard Lower Arm
Upper Arm
Driver Boom
Gaffs
Ends
Arms
Main Boom
1 Qu
2 Qu
3 Qu
Ends fore
aft
middle

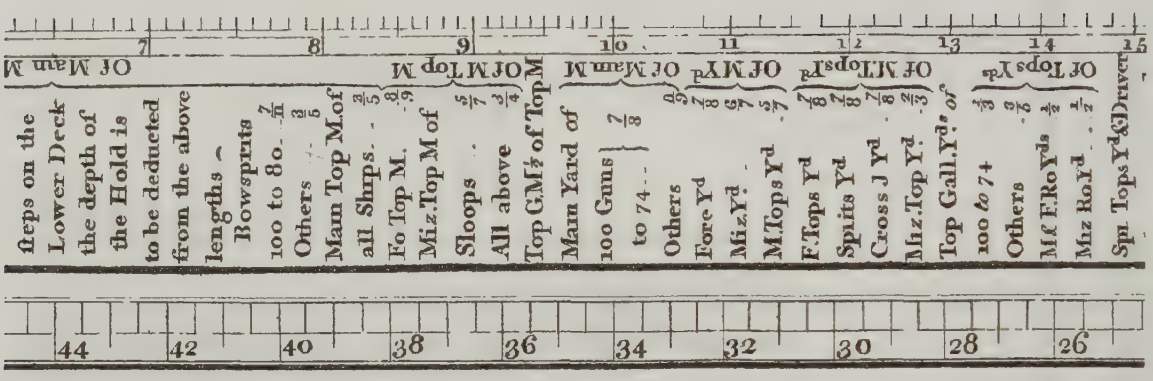
E IMPROVED.


40 30 20 1
5 4 3 2
Length of Mast Heads, in Inches to every Yard in Length
Inc
Main and Fore M . .6
Mizen M Main T. & Fore T 5
Miz. Top M. & all Gall. M. . 4½
Length of Hounds
Lower Masts 7/15 of thear
Top Masts . 3/5 Heads
Heeling
Lower M 2/3
Bowsprit . . 7/12
Thwart
Fore & aft ½
Up & down 2/3
Length of Ch
Oak 3/7 o
Fir 9/20
Broad Head
Middle . .
Lower End
19 18 17 16
09 1 70 1 80 1 90
16 14 12 10 8 6
15 16 17 18 19 2 1 2 3 4 5 6 7 8 9 3 2 4 6 8 4 2 4 6 8 5 6 7
1 9 8 7 6 5 4 3

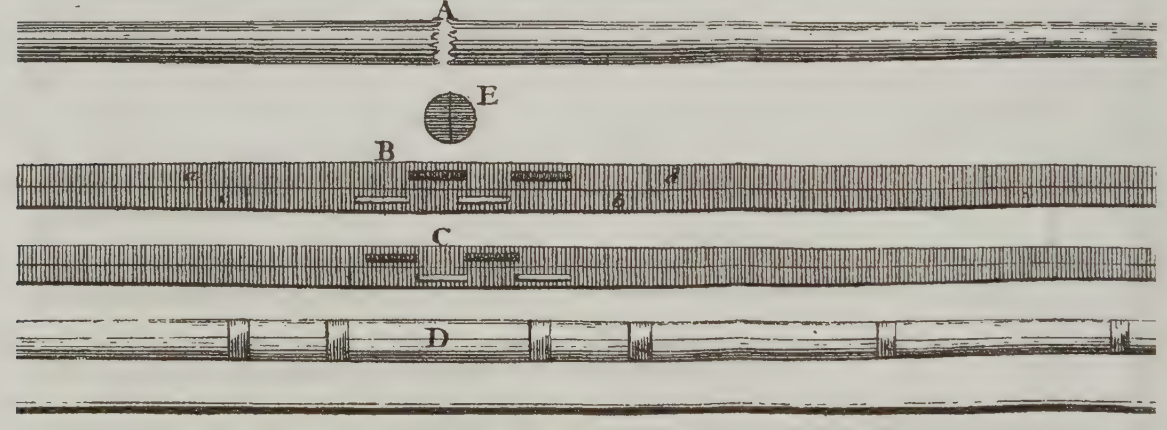


METHOD of MAKING L

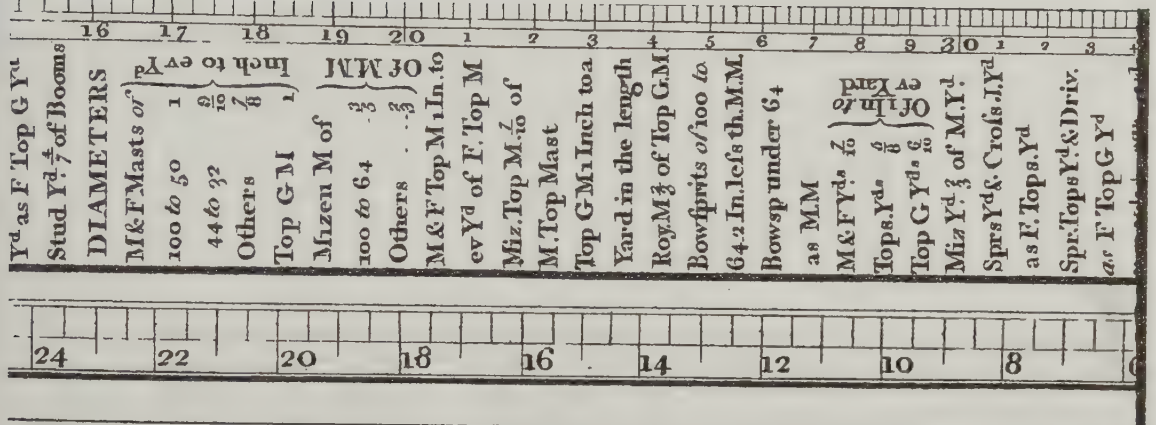




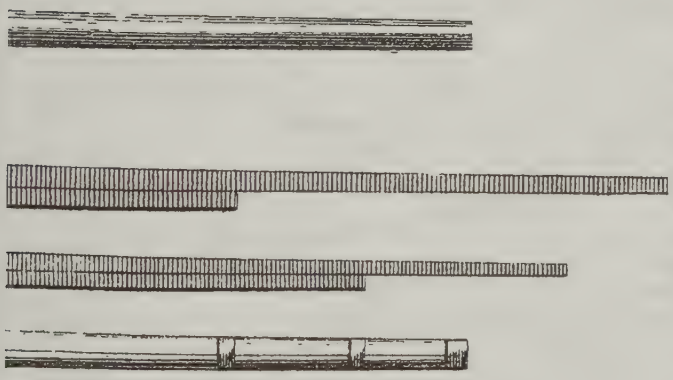
ARGE YARDS of the SMALLEST TREES, and REPA WHEN SPRUNG in the SLINGS.



London Published as the Act directs, August 8th 1797 by D Steel, Little Tower hill, of whom


16 17 18 19 20 1 2 3 4 5 6 7 8 9 30 1 2 3
Yd as F Top G Yd
Stud Yd. 4/7 of Booms
DIAMETERS
M & F Masts or
100 to 50
44 to 32
Others
Inch to ev Yd
Top G M
Mizen M of
100 to 64
Others
M & F Top M 1 In. to
ev Yd of F. Top M
Miz. Top M. 2/3 of
M. Top Mast
Top G M 1 Inch to a
Yard in the length
Roy. M 3/8 of Top G.M
Bowsprits of 100 to
64 2 In. less th. M.M.
Bowsp under 64
as M.M
M & F Yds. 12/16 Of 1 In. to ev Yard
Tops. Yds. 6/8 6/10
Top G Yds.
Miz Yd. 3/4 of M.Yd.
Sprs Yds. & Crofs. Yd
as F. Tops. Yd
Spr. Tops Yd. & Driv.
as F Top G Yd
24 22 20 18 16 14 12 10 8

URING THEM

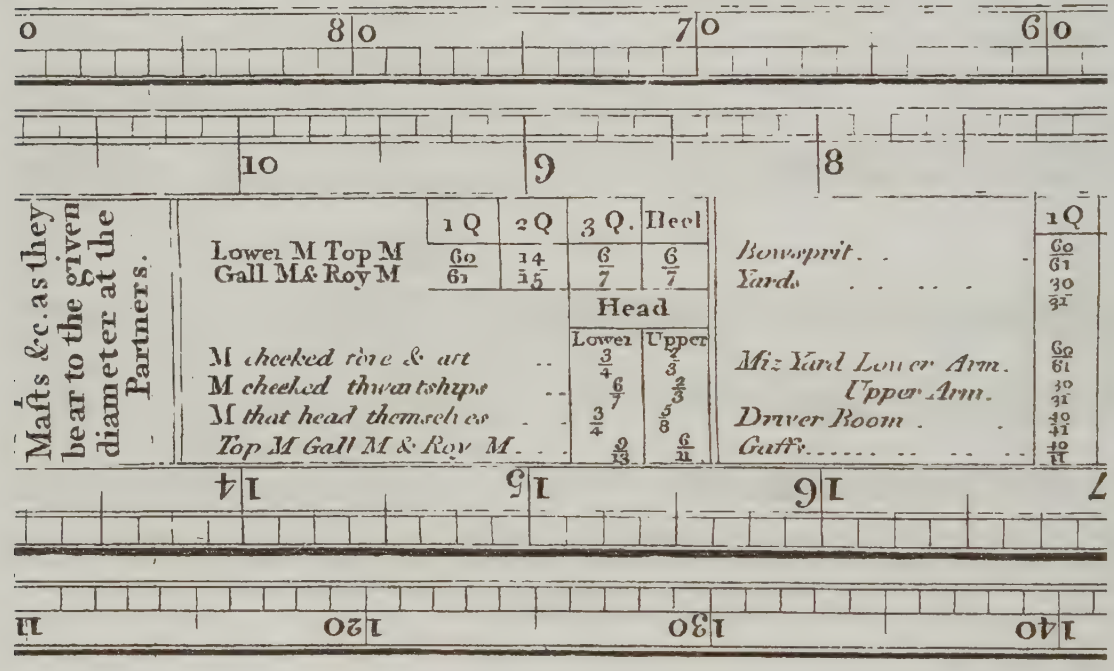


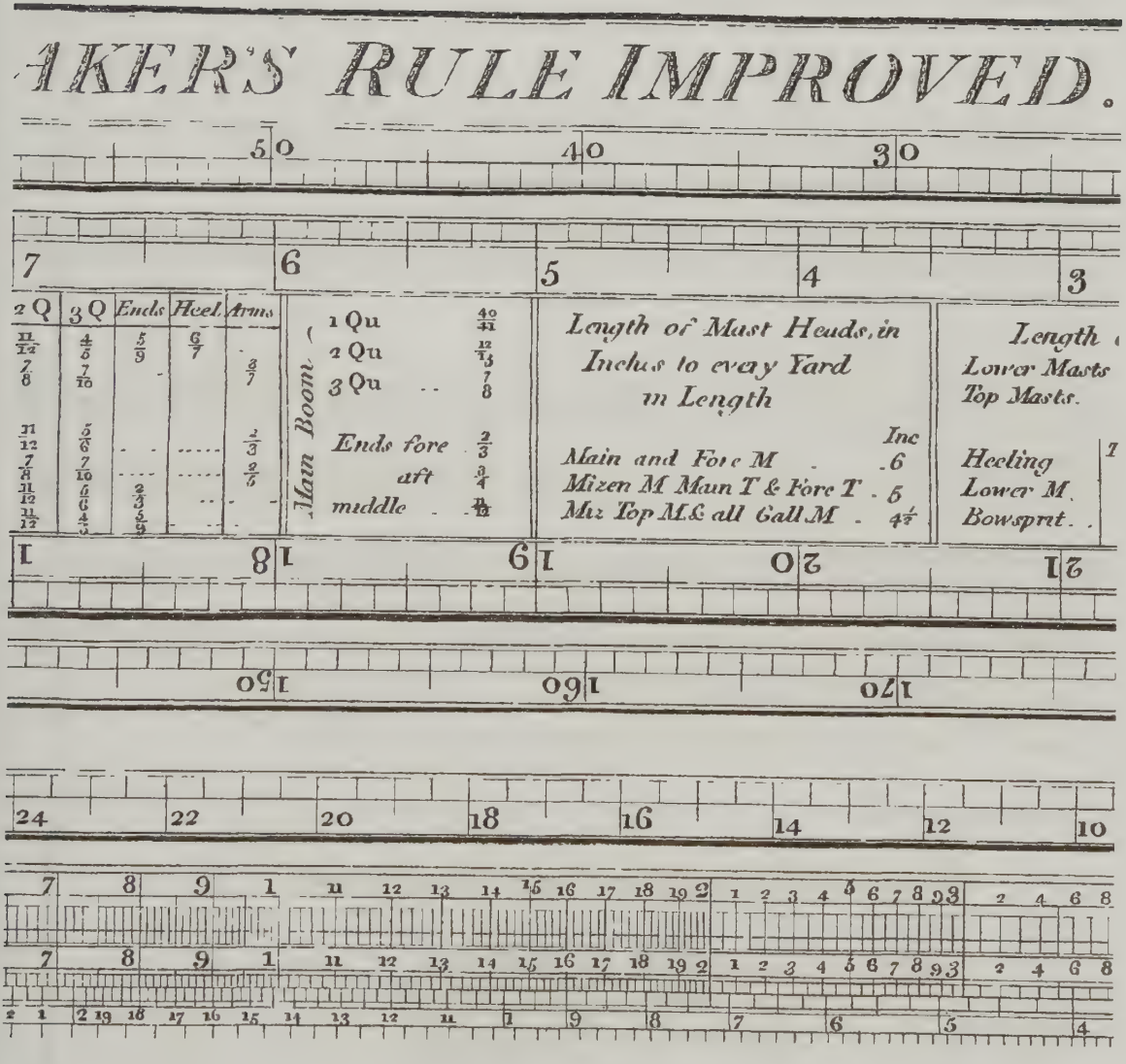
Let A represent a Yard sprung in
and the whole sawed twice length wi
ted in the section E. Then two of the p
ther one sixth of their whole length eq
by means of two or three coaks, mad
quarter of the Yard. Two other piece
and thus form one half of the Yard
equally between the scarph of B keep
ing holes for the coaks of B These th
is secured by two Iron hoops (about
each quarter, and one over each butt
the slings; and those pieces which o
to fill up those that are short of it

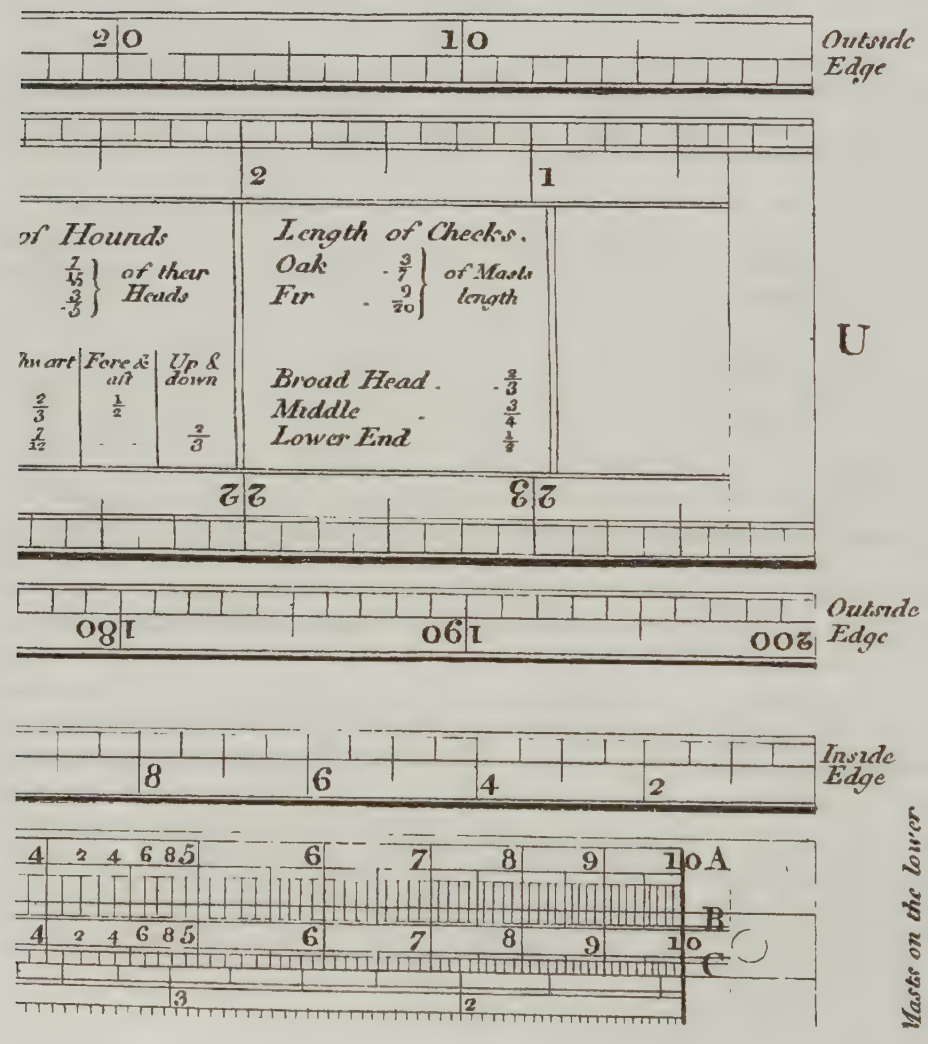
In a similar way may large Yards
pared that are broken at their quar

n Rules, agreeable to the above Engraving, may be had

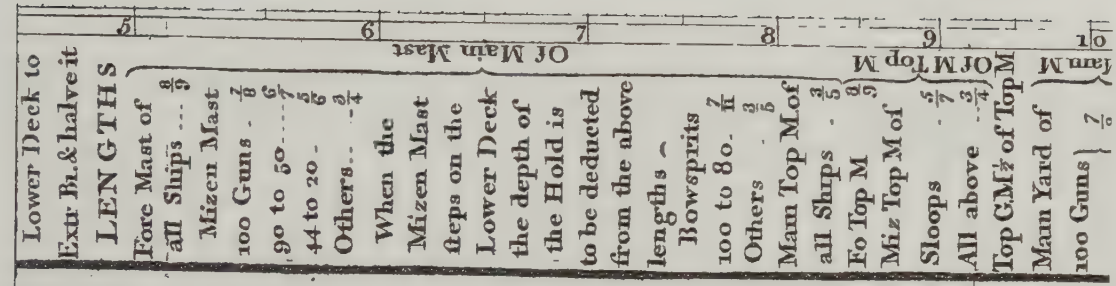
THE MASTM.


Masts &c. as they bear to the given diameter at the Partners.
1 Q
2 Q
3 Q.
Heel
Lower M Top M
Gall M & Roy M
Head
Lower
Upper
M cheeked fore & aft
M cheeked thwartships
M that head themselves
Top M Gall M & Roy M.
Bowsprit
Yards
Miz Yard Lower Arm.
Upper Arm.
Driver Boom
Gaffs
1 Q

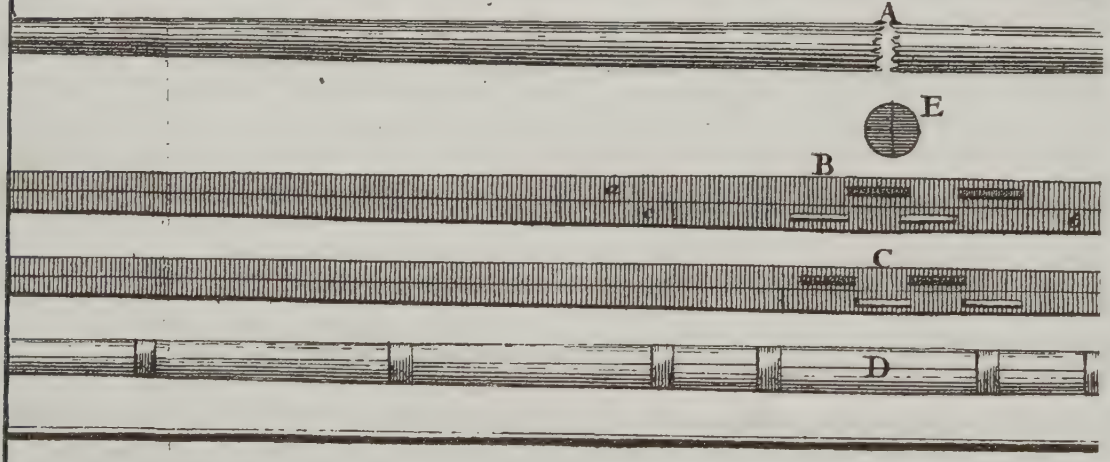

AKER'S RULE IMPROVED.
2 Q
3 Q
Ends
Heel
Arms
Main Boom
1 Qu
2 Qu
3 Qu
Ends fore
aft
middle
Length of Mast Heads, in Inches to every Yard in Length
Inc
Main and Fore M .6
Mizen M Main T & Fore T .5
Miz Top M & all Gall M .4½
Length
Lower Masts
Top Masts.
Heeling
Lower M.
Bowsprit.



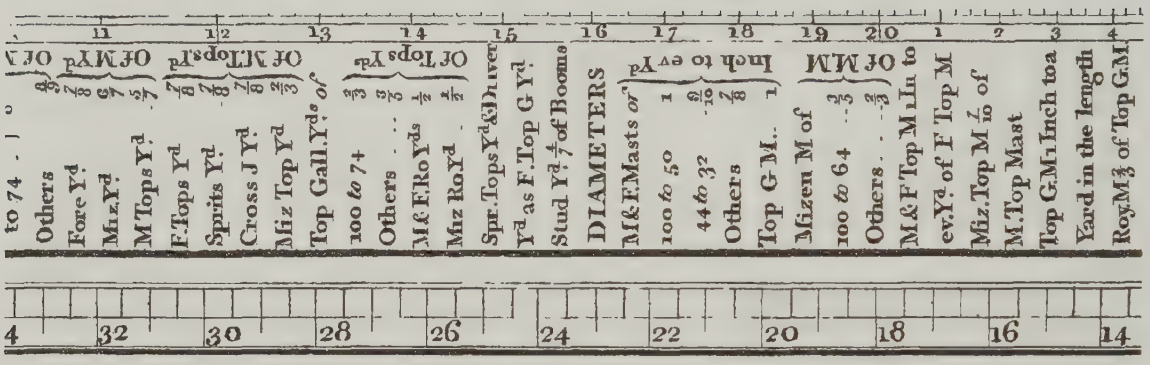
Masts on the lower
inclosed in the Roy.



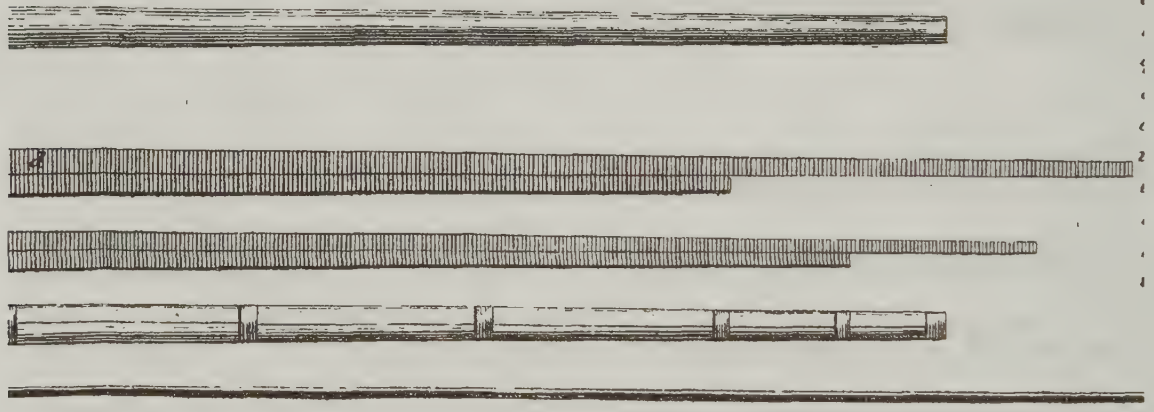
) of MAKING LARGE YARDS of the SMAL.
WHEN SPRUNG in the SL.



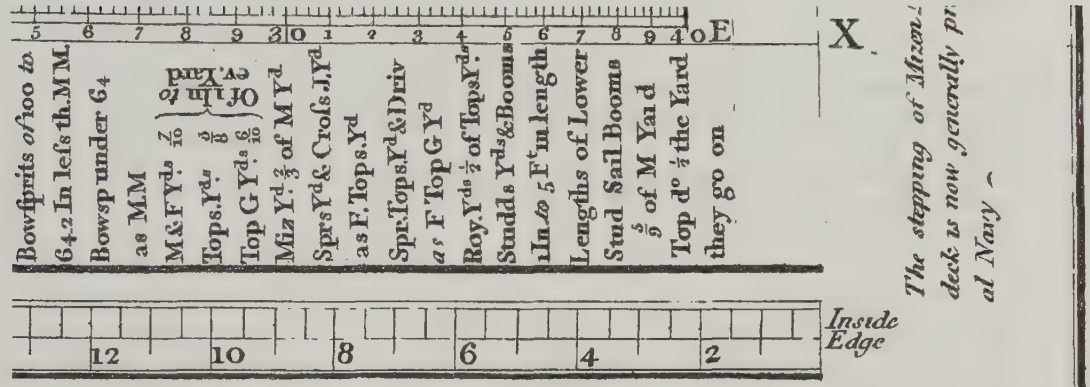
London Published as the Act directs Augus



LEST TREES, and REPAIRING THEM
INGS.



t 8th 1797 by D Steel Little Tower-hill, of whom Rules, agreeable to the above Engraving, may be had

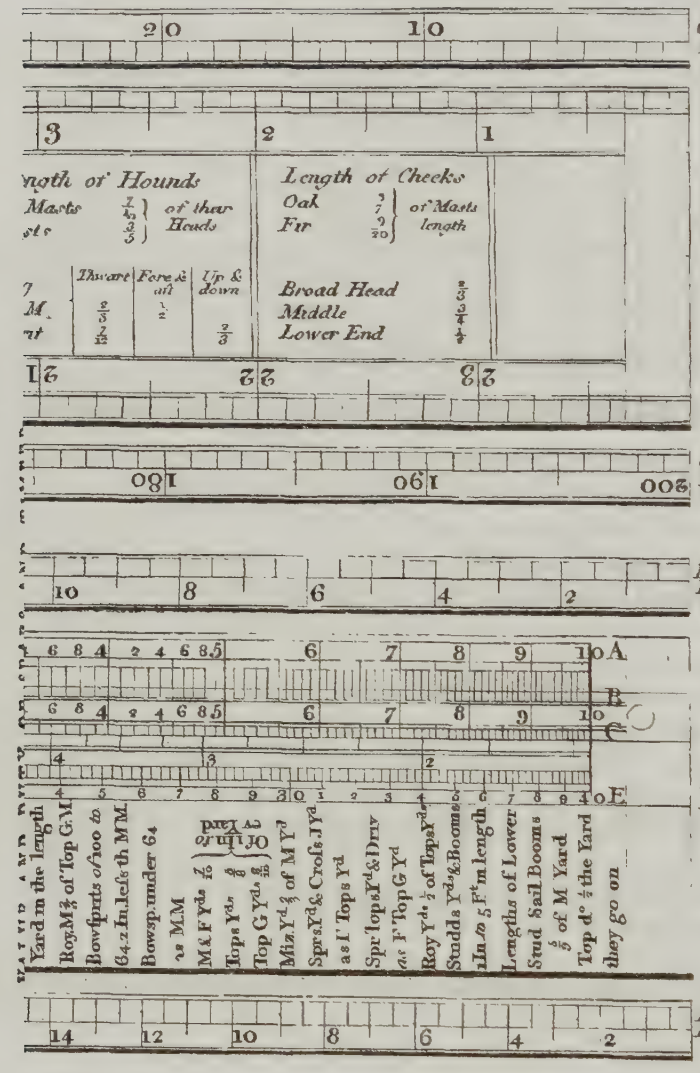

Bowsprits of 100 to 64 2 In lefs th. M M.
Bowsp under 64 as M M
M & F Y.ds 17/10
Tops. Y.ds 9/10
Top G Y.ds 8/10
Of 1 In to ev. Yard
Miz Y.d 3/5 of M Y.d
Sprs Y.d & Crofs J. Y.d
as F. Tops. Y.d
Spr. Tops. Y.d & Driv
as F Top G Y.d
Roy. Y.ds 1/2 of Tops Y.ds
Studs Y.ds & Booms
In 20 5 F in length
Lengths of Lower Stud Sail Booms 3/5 of M Yard
Top d° 1/2 the Yard they go on
X
E
The stepping of Mizen deck is now generally pr al Navy
Inside Edge
12
10
8
6
4
2

Let A *represent a Yard sprung in the slings. The ragged ends to be cut off square and the whole sawed twice lengthwise, that is each cut at right angles as represented in the section* E. *Then two of the pieces, a and b, (fig* B*) are scarphed upon each other one sixth of their whole length equally from the middle of the slings, and secured so by means of two or three coaks, made of dry inch oak board let equally into each quarter of the Yard. Two other pieces (c and d) are placed to the butts of a and b; and thus form one half of the Yard* C *is the other half of the Yard scarphed together equally between the scarph of* B, *keeping the butts at opposite angles, with corresponding holes for the coaks of* B. *These two halves being then placed together form* D *which is secured by two Iron hoops (about 3 Inches broad, and 1/4 to 3/8 of an Inch thick) at each quarter, and one over each butt Then set off the length of the Yard equally from the slings, and those pieces which overlaunch that length are cut off, and returned to fill up those that are short of it*

In a similar way may large Yards be made of the smallest Trees, or Yards be repaired that are broken at their quarters.

G Ellis sc

D.



The slipping of Main Masts on the Lower deck, is now generally practised in the Roy al Navy.

Let A represent a Yard sprung in the slings. The ragged ends to be cut off square and the whole sawed twice lengthwise that is each cut at right angles as represented in the section E. Then two of the pieces, a and b, (fig B) are scarphed upon each other one sixth of their whole length equally from the middle of the slings and secured so by means of two or three coaks, made of dry inch oak board let equally into each quarter of the Yard. Two other pieces c and d (are placed to the butts of a and b, and thus form one half of the Yard. C is the other half of the Yard scarphed together equally between the scarph of B keeping the butts at opposite angles, with corresponding holes for the coaks of B. These two halves being then placed together form D which is secured by two Iron hoops (about 3 Inches broad and ¼ to ⅜ of an Inch thick) at each quarter, and one over each butt. Then set off the length of the Yard equally from the slings and those pieces which overlaunch that length are cut off, and returned to fill up those that are short of it.

In a similar way may large Yards be made of the smallest Trees, or Yards be repaired that are broken at their quarters.

A

DESCRIPTION

OF THE

IMPROVED

MAST-MAKER's RULE,

AND OF ITS

U S E S.

THIS rule is made of box-wood, having two legs, each of 12 inches in length. Upon its ſurfaces and edges are engraved lines, fractional portions, &c. particularly adapted to maſt-making.

On one ſide, (marked in the engraving U,) are 24 inches, ſubdivided into halves, quarters, and eighths. Between this line of inches, when the rule is ſhut, are contained fractional proportions of the different diameters of maſts, &c. at their quarters, heads, and heels, as they bear to the given diameter at the partners.

On the other ſide are contained a Gunter's line, (or a line of numbers,) marked A; the ſlide, whoſe two edges are marked B and C, the inverted line, marked D; and the girt-line, E. This ſide likewiſe contains proportions for finding the lengths and diameters of all maſts, yards, &c.

The

The outside edge, supposing the rule open, is divided into 200 equal parts, for the more readily finding the decimal of inches and their parts, and for use occasionally as a scale of equal parts. Thus, as to the readily finding the decimal of any given number of inches, suppose it were wanted for $7\frac{1}{2}$ inches, against $7\frac{1}{2}$ inches will be found, on the outer edge, a corresponding division of 62 and a half, which, decimally expressed, is .625.

On the inside edges are two divisions of lines, which may be used indifferently for the same purpose, namely, the eight-squaring of a four-sided piece The one is marked EDGE, and the other EIGHT-SQUARE FROM THE MIDDLE LINE. They are thus used: Take with compasses, from either of these edges, as many divisions and their parts as the diameter of the four-sided piece has inches and parts, and set off that distance from the four sides, if the line marked EDGE was used, or from the middle of each side, if the line marked EIGHT-SQUARE was used. The angles being taken off to those points will leave an octagon, or eight-square piece.

DESCRIPTION AND USE OF THE GUNTER'S LINE.

The upper line, marked A, is the Gunter's line, or double line of numbers logarithmically divided; and, under it, a slider, divided in the same manner on both of its edges, the upper edge marked B, the lower edge C: by moving which slider, problems are solved instrumentally, in the same manner as logarithms do arithmetically.

It is divided into a hundred parts, every tenth whereof is numbered, beginning with one and ending with ten: so that, if the first great division, marked 1, stands for one-tenth of any integer; the next division, marked 2, will stand for two-tenths, 3, three-tenths; and so on and the intermediate divisions will, in like manner, represent one hundredth parts of the same integer. If each of the great divisions represent ten integers, then will the lesser divisions stand for integers; and, if each of the greater divisions represent a hundred integers, the subdivisions will be each ten, if thousands, then hundreds, &c.

The

The line being thus conſtructed, it will be eaſy to find any number upon it: and, that it may be done with expedition, where the ſpaces are divided into ten parts betwixt the figures, every fifth is diſtinguiſhed by longer ſtrokes than the tens. Now the value of theſe ſtrokes is determined by the value of the figures, as before-mentioned, which being arbitrary, their value muſt be determined before any number upon the line can be aſcertained. If the number be leſs than 100, 1 at the left-hand end may be unity, then 1 in the middle will be 10, 1 at the right-hand end 100. The ſtrokes, repreſenting the tens in the firſt great diviſion, will be the tenths of units, and thoſe in the next great diviſion will be units. The ſhort ſtrokes between the tens are eſtimated according to their number: where there are 9 intermediates, each will be one-100th part of an unit in the left-hand diviſion, and one-tenth of an unit in the right-hand diviſion. If there be only four intermediate ſtrokes, each will be two-100th parts or two-tenths of unity: and, if there be but one ſtroke, it will be five-100th parts or five-tenths of unity.

If 4 were required, look for that figure in the left-hand diviſion: if 20, it will be at 2 in the right-hand diviſion; if $4\frac{1}{2}$ or 4 5, count 5 ſtrokes beyond the figure 4 in the left-hand diviſion, if 400 were required, the firſt 1 at the left muſt be accounted 10, the next 1 a hundred ſo, figure 4 in the right-hand diviſion will be 400, 430 will be three ſtrokes beyond figure 4; 435 will be in the middle betwixt the third and fourth ſtroke beyond figure 4; if 433, a little more than one-quarter of the ſpace betwixt the third and fourth ſtroke muſt be taken.

MULTIPLICATION BY THE LINE OF NUMBERS.

RULE. — Place 1, on the ſlide, under either of the given numbers, then, above the other given number on the ſlide, towards the right hand on the rule, is the product.

EXAMPLE. — Multiply 7 by 5. Set 1, upon the line B, to 5, upon the line A, then, over 7, upon the line B, is 35, the product ſought upon A.

EXAMPLE. — Multiply 98 by 8. Here, 98, when 1 to 8 on the firſt diviſion are only conſidered as units, would reach beyond

the end of the line, therefore, 1 at the beginning of the line must be accounted 10, so, 98 will be found in the first division: then, set 10, on the line B, under 80, in the first division on the line A, and over 98, upon the line B, is 784, the product required upon A. When the slide is thus set, we have the product of any number, multiplied by 8, for, above 20 is 160, above 50 is 400, above 120 is 960, and, as 200, on the slide, goes beyond the line upon the rule, in this and the like cases, the value of the figures, as observed before, must be altered, and 1 at the beginning must be 100; then, above 2 or 200, we have 1600 the product.

DIVISION BY THE LINE OF NUMBERS.

This is only the reverse of multiplication, for, set the divisor, on the slide, against 1 on the rule, and, against the dividend, on the slide, the quotient will be found upon the rule.

EXAMPLE. — Let 48 be divided by 8. Set 8, upon the slide, against 1 upon the middle of the line A, and, above 48, upon the slide, is 6, upon the line A, the quotient sought. In this position, without moving the slide, the quotient of any number divided by 8 is readily seen.

Hence, to reduce a vulgar fraction into a decimal, add a cipher to each part of the fraction; and, if the denominator, upon the slide, is set against 10, upon line A, then, above the numerator upon the slide, will be found the decimal fraction upon the line A. Thus, the vulgar fraction $\frac{6}{8}$ or $\frac{60}{80}$ will be found to be .75 in decimals.

RULE OF THREE BY THE LINE OF NUMBERS.

RULE. — Set the first term, upon the slide, against the second term, upon the line A, and, above the third term, upon the slide, will be found the fourth term sought, upon the line A.

EXAMPLE. — Suppose 50 feet of timber (or one load) cost 65 shillings, what will 270 feet (or 5 loads 20 feet) come to. — As 50 . 65 · : 270 · 351.

Set 50, upon the slide, under 65, upon A then, above 270, upon the slide, is 351, upon A, the value of 270 feet of timber. It is indifferent whether the first term be taken on the slide or on the

the rule, provided the third term be taken on the ſame line as the firſt. Neither is it material which of the means is taken for the ſecond term, for, as 50 · 270 : 65 : 351.

But, as the anſwer to the above and ſuch like queſtions is ſometimes required in pounds, this muſt again be divided by 20, and the operation by arithmetic would be $351 - 20 = 17l.\ 11s.$ By the rule, 1, on the ſlide, is placed under 20, or figure 2, in the firſt diviſion of the line A, then, under 351, upon the ſame line, is, upon the line B, 17, and 3 of the ſmall diviſions nearly, which are fifths, each of which in this caſe muſt be reckoned 4*s.* ſo that 17 and almoſt 3-fifths will be $17l.\ 11s.$ or, as 50 . $3l.\ 5s.$: · 270 $17l.\ 11s.$ Place 50, or figure 5, upon the ſlide, under 3 and $2\frac{1}{2}$ tenths, upon line A, $= 5s.$ then above 270, upon the ſlide, is 17 and 3-fifths nearly of a pound, upon the line A.

EXAMPLE. — What is the $\frac{5}{8}$ of 64? As the $\frac{5}{8}$ of 8 is 5, ſay, by the rule of three, if 8 gives 5 what will 64 give? The anſwer will be 40· for, as 8 5 : 64 . 40.

From this example, take the following rule for finding the quarters, &c. of maſts, yards, &c. having the diameter at the partners or ſlings given, and the fractional proportion of the quarters, &c. to the diameter at the partners or ſlings.

RULE. — Set the denominator of the fraction againſt the numerator, and, againſt the given diameter, will be the quarter required.

EXAMPLE. — If a maſt is 37 inches diameter at the partners, what will it be at the firſt quarter, the proportion being $\frac{60}{61}$ of that at the partners? Set 60, upon the ſlide, under 61, upon the line A, and, under 37, upon A, is $36\frac{3}{8}$, upon B — 61 . 60 37 $36\frac{3}{8}$. Then, by uſing the ſame operation as for finding the firſt quarter, you will find the ſecond quarter $34\frac{1}{2}$ inches, the third quarter $31\frac{3}{4}$ inches, lower part of the head $27\frac{3}{4}$ inches, and the upper part of the head $24\frac{5}{8}$ inches.

OF MEASURING PLANK.

All plank is conſidered as an oblong ſquare, and meaſured as a plain ſurface, without any regard to its thickneſs, and all the

varieties thereof may be reduced to the Rule of Three by the following proportions.

As 1 : length in feet : : breadth in feet :
As 12 : length in feet : breadth in inches · } area in feet.
As 144 length in inches · · breadth in inches .

EXAMPLE. — Let there be 3 planks of the following dimenſions.

Ft Long	In Broad	Length	Breadth	Area.		
20	11	as 1 . 20	. 92 nearly	18 4	or, as 12 20 : 11 18 4	or, as 144 . 240 : : 11 . 18 4
30	15	as 1 . 30 .	1.25 nearly	37 5	or, as 12 . 30 15 . 37 6	or, as 144 : 360 . : 15 : 37 6
15	18	as 1 15 .	1.5 nearly .	22 5	or, as 12 : 15 : 18 . 22 6	or, as 144 . 180 : . 18 . 22 6

Here every example is done three different ways, containing nine different queſtions in the Rule of Three. Their ſolutions will be found as before-directed, for, if 1, at the beginning of the ſlide, be accounted 1-tenth, 1 in the middle will be unity. If, then, this 1, in the middle of the ſlide, be ſet againſt 20, upon the line A, then will .92 nearly be againſt 18 feet 4 inches. As the breadth, in the firſt queſtion, is leſs than one foot, the decimal of 11 inches muſt be taken from the outſide edge of the rule, which will be found to be .92 nearly. or, if 12 be ſet under 20, then over 11 will be 18 feet 4 inches, which is the general way of meaſuring plank. or, if 144 be ſet under 240, then above 11 will be 18 feet 4 inches. The like may be ſaid of all the reſt.

Though all plank is meaſured as a ſurface, the value is eſtimated by the load, which is 50 feet ſolid. The following proportion will ſerve to find how many ſuperficial feet of plank will make a load, viz. as the inches thick : 12 : 50 (the ſolid feet in a load) : the ſuperficial feet.

EXAMPLE. — How many ſuperficial feet of 2, 3, 4, 5, 6, inches plank will make a load?

Set 2, upon the ſlide, under 12, upon A, then will 5 or 50, on the line B, be under 3 in the next diviſion, or 300, upon the line A, and ſo for the others. as 2 : 12 : . 50 300 | as 3 · 12 · : 50 : 200 as 4 12 : 50 : 150 | as 5 · 12 . : 50 . 120 | as 6 : 12 : : 50 100.

OF MEASURING TIMBER.

Find the ſuperficial content, as if it was plank: this, multiplied by the thickneſs in inches, and the product divided by 12, the quotient will be the content in feet. So, to both operations, the proportions are,

1ſt. As 12 : length in feet : : breadth in inches . area in feet.

2d. As 12 . area in feet : thickneſs in inches contents in feet.

Or, as 1 . breadth in inches : thickneſs in inches a fourth number.

And, as 144 . fourth number : . length in feet contents in feet.

That is, multiply the breadth by the thickneſs, if both be inches, and the product by the length in feet, divide the laſt product by 144, the quotient will be the length in feet

EXAMPLE. — Required the content of a piece of timber 30 feet long, 21 broad, and 25 inches thick.

1ſt. as 12 30 0 : 21 : 52 6 or, as 1 : 21 : : 25 . 525 0

Then, as 12 52 6 : : 25 109 $4\frac{1}{2}$ or, as 144 . 525 : 30 109 $4\frac{1}{2}$

By the line of numbers, the ſlide muſt be drawn twice. firſt, 12, on the ſlide, ſet under 30, upon A, then, 21 will be under 52.5, upon A: ſecondly, 12 under 52.5 and over 25 will be 109 5, upon A. This is quite near enough, as, in meaſuring timber-contents, nothing leſs than $\frac{1}{2}$ a foot or .5 is uſed. or 1 placed under 21, upon A, over 25, will be 525, and, if 144 be placed under 525, over 30, will be 109.5, nearly as before. There is no neceſſity to account the value of the fourth proportional to the three firſt numbers, for, if a ſmall mark be made with a pencil, ſo as the ſlide may be moved till 12 or 144 be under, it will anſwer the ſame: but, as an inconveniency may attend this, make uſe of the inverted line, which performs the operation by once moving the ſlide.

DESCRIPTION AND USE OF THE INVERTED LINE D.

The ſlide moves between two double lines of numbers, of which the lower one is inverted in ſuch a manner, that 12 upon the ſlide is exactly over 12 upon the inverted line, marked at the end D; ſo, 50, 60, &c. upon the inverted line, are as much to the left hand of the point 12 as 50, 60, &c. &c. are to the right hand

hand of the point 12 upon the line A. In expreſſing the inverted line, we begin at the right hand, and, becauſe the diſtance between 1 and 12 is more than that betwixt 12 and 100, the inverted line begins at 14, for 1 would extend beyond the end of the rule.

The ſlider having two double lines of numbers, graduated exactly as the line A, whatever way the ſlide is moved the point 12 upon A and the point 12 upon the line C will be both againſt the ſame number.

TO MEASURE TIMBER BY THE INVERTED LINE, WHEN THE BREADTH AND THICKNESS ARE UNEQUAL AND BOTH GIVEN IN INCHES, AND THE LENGTH IN FEET.

RULE. — Place either the breadth or thickneſs upon the ſlide, ſuppoſe the thickneſs 25 inches, to 21 inches, the breadth, upon the inverted line, then, under the length, ſuppoſe 30 feet, upon the line A, is 109.5 nearly, upon the line B, the contents.

EXAMPLE. — Suppoſe a piece of timber 20 feet long, 18 inches broad, and 15 inches thick: ſet 18, upon the ſlide, line C, over 15 on the inverted line, and, under 20, upon the line A, is $37\frac{1}{2}$, the contents upon the line B.

DESCRIPTION AND USE OF THE SINGLE LINE, COMMONLY CALLED THE GIRT-LINE, E.

The ſingle line, called the girt-line, is marked E, and its radius is equal to two radii of any of the other lines it is broke for the eaſier meaſurement of timber, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, &c. From 4 to 5 it is divided into ten parts, and ſo on from 5 to 10, thence to the end into fourths and quarters.

TO FIND A MEAN PROPORTIONAL BETWEEN ANY TWO GIVEN NUMBERS.

RULE. — Set one of the given numbers upon C over the ſame number upon E, and then, under the other given number upon C, is the geometrical mean ſought upon E.

EXAMPLE.

EXAMPLE. — Let the numbers given be 23 and 13 to find a mean. Set 23 upon C over 23 upon E, then, under 13 upon C, is 17 35, on E, the mean ſought.

TO MEASURE UNEQUAL-SIDED TIMBER BY THE GIRT-LINE.

RULE. — Set 12, upon the girt-line E, to the length on the line C, and, over the mean, upon the line E, are the contents upon C.

EXAMPLE. — Let the length of a piece of timber be 13 feet, the breadth 23 inches, and the depth 13 inches. Seek the mean as above, and there make a fine pencil ſtroke, then ſet 12 upon the line E to 13 feet, the length, upon C; and, over 17.35, or fine ſtroke, upon E, is 27 feet, the contents.

TO MEASURE TAPER TIMBER.

RULE. — The length being meaſured in feet, note one-third of it, which is found thus: ſet 3, on the line A, to the length, upon the line B, then, under 1, upon A, is the third part upon B. Then, if the ſolid be round timber, meaſure the diameter at each end in inches, and ſubtract the leſs diameter from the greater, add half the difference to the leſs diameter, the ſum is the diameter in the middle of the piece. Then, ſet 13.54 on the girt to the length on the line C, and, over the middle diameter, on the girt, is a fourth number on the line C. Again, ſet 13.54, on the girt-line, to the third part of the length, on the line C, then, againſt half the difference on the girt-line, is another fourth number, upon the line C theſe two fourth numbers added together give the contents.

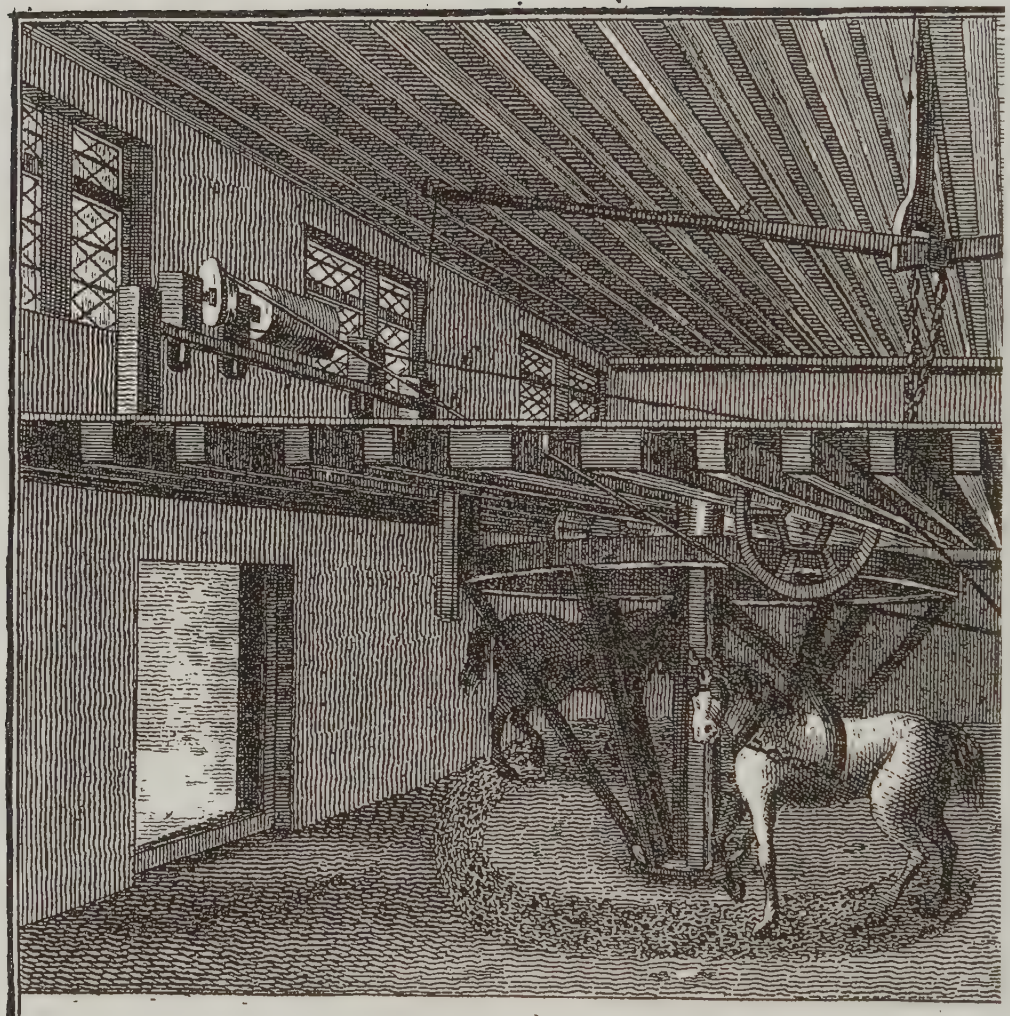
EXAMPLE. — Suppoſe the length be 27 feet, (one-third whereof is 9,) the greater diameter 22 inches, and the leſſer 18, the ſum of the two will be 40, their difference 4, and half-difference 2. The half-difference 2, added to the leſs diameter, gives 20 inches for the diameter in the middle. Now, ſet 13.54, on the girt-line, to 27, on the line C, and, over 20, upon the girt, is 58.9 feet. Again, ſet 13.54, on the girt-line, under 9, upon the line C, and, over 2, upon the girt-line, (repreſented by 20,)

is .196 parts, therefore by adding 58.9 feet to .196 feet, the ſum is 59.096 feet, the contents.

If the timber be ſquare, and have the ſame dimenſions, that is, the length 27 feet, the ſide of the greater end 22 inches, and that of the leſſer end 18 inches: to find the content, ſet 12, upon the girt-line, to 27, the length, upon C; and, over 20 inches, the ſide of the mean ſquare, on the girt-line, is 75 4 feet, upon C. Again, ſet 12, upon the girt-line, to 9 feet, one-third of the length, upon the line C, and, over 2 inches, half the difference of the ſides of the ſquares of the ends, on the girt-line, is .25 parts of a foot, both together make 75.65 feet, the content of the ſolid.

The girt, or circumference, of a tree or round piece of timber given, to find the ſide of the ſquare within, or the number of inches of a ſide, when the round timber is ſquared.

Set 10, upon A, to 9, upon B, then, againſt the girt, or circumference, on A, are the inches for the ſide of a ſquare, on the line B.



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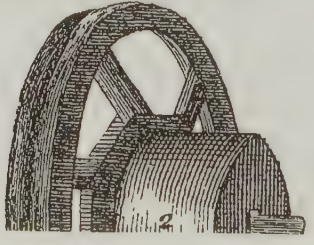

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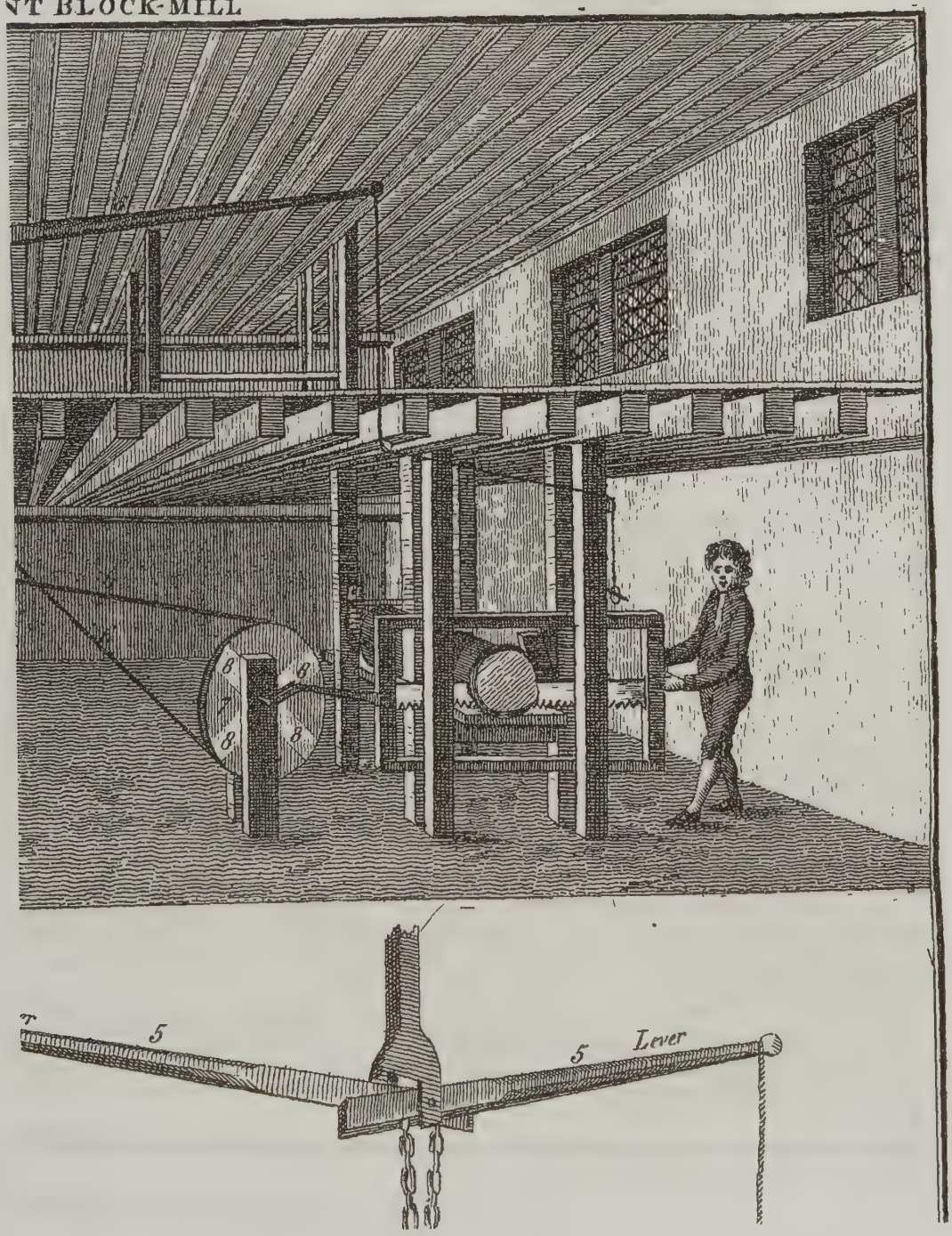

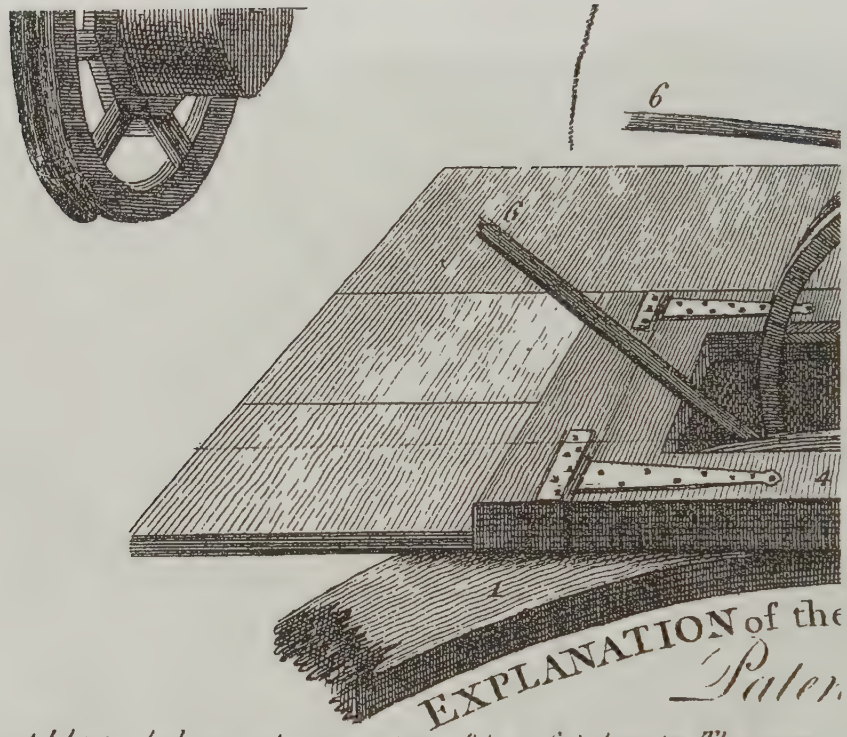

EXPLANATION of the Plate.

1 The horizontal horse wheel, or great sweep, is from 18 to 20 feet diameter. The upper surface is 9 or 10 Inches broad perfectly smooth and runs correctly horizontal

2 The Vertical or Friction wheel. Of this there are two sorts double and single, the first runs with two leathers round its circumference, giving motion to two lathes, or to a lathe and a saw frame and is thus constructed. Its centre consists of a solid cylinder of about 20 or 24 Inches diameter and 8 or 9 Inches long with a surface perfectly smooth the extreme circumference of the wheel is from 3 to 4 feet diameter carries two leathers, by being hollowed towards the middle and rising towards the edges, thus ⌣ by which the leathers running on opposite sides do not interfere with each other the felley is about 5 Inches thick and about 3 Inches deep. The single wheel differs from the other only in the shape of the felly, which has one curvature only thus ⌒ and is about 3 Inches square. The Axis of these wheels is of Steel, about one Inch diameter

3 A Square Iron box moleseeny patent rollers on which the Axis of the friction wheel works. This box is fastened to

4 A frame of Oak, the sides and ends of which are 6 Inches broad and 4 Inches deep the length of the frame in the clear is 6 feet and its breadth about 15 Inches. This frame is fastened by hinges at one end, to a piece of Oak, fixed to the joist or floor and is occasionally lifted, by the lever removing thereby the friction wheel from being acted upon by the great sweep wheel

5-5 Are the two levers used to lift the friction wheel from the great sweep by a cord from each lever to one lathe or to one saw frame. Thus when the workman wants to stop the machine, he pulls upon the cord, and raising the friction wheel about one Inch from the great sweep, its motion ceases. And when he wishes to renew his work he lets the cord go, and immediately the two wheels coming into contact the motion is renewed

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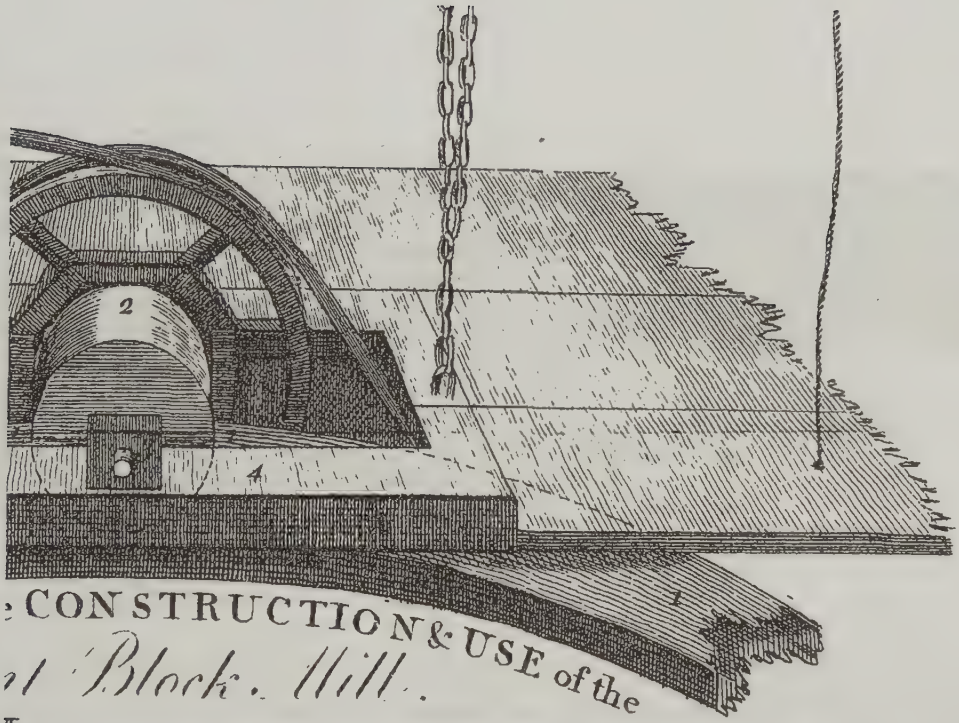


CONSTRUCTION & USE of the

Block. Mill.

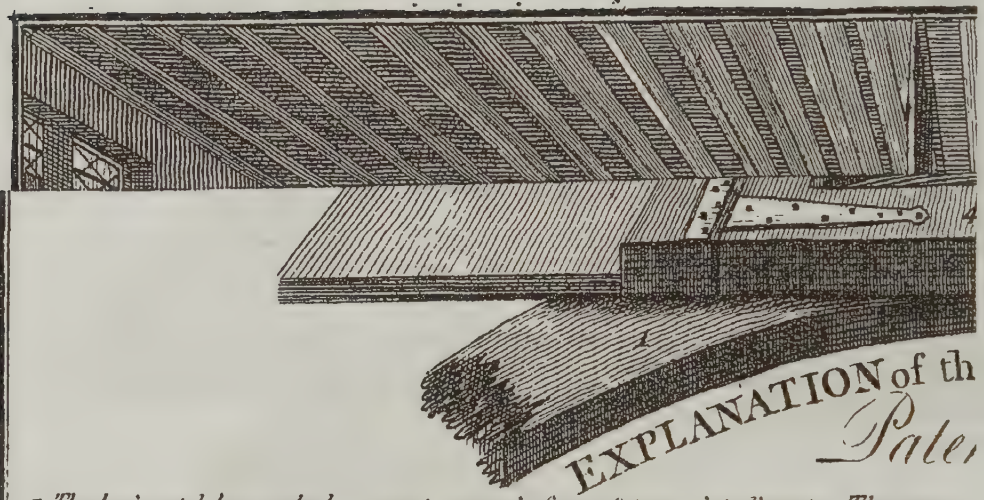
One disadvantage attends the use of the double wheel, which is that its removal from the great sweep causes the two machines to rest

6 The the leather bands which pass round the friction wheel to the wheel of those Machines which are to be set in motion

Its uses

From the previous explanation of the construction its uses may be readily conceived Five, six or seven friction wheels may be adapted to the great sweep in proportion to its size, the power used to turn it and extent of the building containing it; and these wheels may be double or single — The great ends to which this invention is applied is the cutting of sheaves by the saw frame, the turning of sheaves, pins, &c by the common lathes & the boring of sheave blocks &c by a lathe with a sliding puppet It may be necessary here to explain the nature of the lathe with the sliding puppet, & also the construction of the saw frame The lathe differs from the common lathe in this The puppet, on which the work to be bored is fixed, is larger than ordinary, & slides on brass it is pulled backward from the mandrel by a weight hanging through a shear in the leg There is likewise fixed in the sliding puppet two sheaves, and in the other leg two sheaves, through which a rope passes, having its standing part fixed to the leg, and when its fall is pulled on by the workman it presses the sliding puppet (which has on it the sheave, &c to be bored) towards the bit in the mandrel and, when the hole is made, the workman lets go the rope & the weight draws back the puppet The Saw frame is worked by the leather band going round the wheel (7) the parts of which marked 8 are boards 6 or 7 inches wide, which slide in & out being dovetailed They are brought out to a little beyond the edge in order to keep the band from slipping off The timber to be sawed is confined near the saw by chocks & a wedge & at the other end by means of a screw which pressing down on it prevents its rising

for D Steel, Sept 1st 1794



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s. for D. Steel, Sep 1st 1794

GENERAL DESCRIPTION AND USE OF BLOCKS.

BLOCKS are well known mechanical inſtruments, poſſeſſing the properties and powers of pulleys. Theſe powerful inſtruments have from 1 to 8 ſheaves. The blocks in general uſe are, the SINGLE BLOCK, the DOUBLE BLOCK, the TREBLE BLOCK, and the FOURFOLD BLOCK, but, when heavy weights or bodies are required to be raiſed or moved, blocks with a greater number of ſheaves are applied, the increaſing power being as two to one for every ſheave moving with the object.

BLOCKS, differing from the common ſhape, are the BEE-BLOCK, (which is made by the maſt-maker,) the CAVEL-HEAD-BLOCK, the CHEEK-BLOCK, the LONG-TACKLE-BLOCK, the MAIN-SHEET-BLOCK, the MONKEY-BLOCK, the NINE-PIN-BLOCK, the RACK-BLOCK, the SHOE-BLOCK, the SHOULDER-BLOCK, the SISTER-BLOCK, the SNATCH-BLOCK, the STRAP-BOUND-BLOCK, the VIOL-BLOCK, and the WARPING-BLOCK. To the blocks may be added the dead-eyes, hearts, parrels, trucks, uphroes, cleats, belaying-pins, toggles, thimbles, travellers, bull's eyes, &c. theſe being all furniſhed by block-makers.

The PRINCIPAL PARTS of blocks are their SHELLS, SHEAVES, and PINS, which are of various ſizes and powers, according to the effect they are to produce.

The DIMENSIONS of the ſhells, and the thickneſs and number of the ſheaves, are proportioned to the ſize of the ropes working in them, and the powers required: the ſheaves turn abreaſt of each other in the ſhell, on one axis or pin, or one above another on ſeparate pins.

The SHELL is made of elm or aſh, and hollowed between the cheeks, with one or more ſheave-holes to receive the ſheave or ſheaves. On the outſide of the cheeks of blocks that are to be ſtrapped, one SCORE is cut, towards the ends, in which part of the ſtrap is buried: if they are double-ſtrapped, they have two ſcores. A hole is bored through the centre to admit the pin, which, paſſing through both ſides of the ſhell, forms the axis for the ſheaves.

The SHEAVE is a ſolid cylindrical wheel, and round its circumference is a groove one-third of the thickneſs of the ſheave deep, in which the rope works. It is commonly made of lignum vitæ; but, when for very laborious purpoſes, it is coaked in the middle with metal, or elſe made of caſt metal: if the ſheave is iron, it is coaked with braſs, and, if of braſs, with the hardeſt bell-metal. The hole in the centre is ſomething larger than the pin.

The PIN is made of lignum vitæ, cocous, green-heart, or iron, and is the axis on which the ſheaves turn.

DESCRIPTION OF THE TOOLS,

AND

EXPLANATION OF THE TERMS,

USED IN

BLOCK-MAKING.

ARSE of a block. The end through which the fall reeves.

AUGER. An iron inſtrument to bore holes with, it conſiſts of a ſhank, having at one end a bit, and at the other end an eye to admit a handle, by which it is worked.

BEARDING. Reducing the thickneſs on the ſides or edges.

BITS. Iron inſtruments reſembling the ſhank of a gimblet, about 6 inches long, and from $\frac{1}{2}$ of an inch to 1 inch diameter, having at their ends either a ſcrew, a ſharp point, or edge, to cut or bore holes with. They are inſerted into a STOCK or handle. There are various ſorts, according to the purpoſes for which they are intended, ſuch, for inſtance, are the CENTRE-BIT, having in the middle of its end a ſmall ſteel

point,

point, with a ſharp edge on one ſide to cut horizontally, and a ſharp tooth on the oppoſite ſide to cut vertically · holes bored with this inſtrument are not liable to ſplit. The large CENTRE-BIT, for boring holes through elm, differs nothing from the former in the cutting part; but the plate from which the cutting part is made is let into a wooden ſhaft or handle, and rivetted, a ferrule or ſmall hoop being firſt let over the end to prevent ſplitting; at the other end of the ſhaft is a male ſcrew cut to the ſize of the mandrel, as this inſtrument is uſed in the block-mill or horſe-engine. The COUNTER-SUNK-BIT has two cutting edges reverſed, forming an angle from the point. The large COUNTER-SUNK-BIT, which is uſed in the block-mill for boring holes in lignum vitæ or other hard wood, is exactly the ſame at the cutting part, but is ſecured to a handle as the large centre-bit. The GOUGE-BIT is rather ſmaller than the common centre-bit, with a hollow edge at its end, ſimilar to a gouge. The NOSE-BIT is ſimilar to a gouge-bit, but has a cutting edge on one ſide of the end.

BOX of a rib-ſaw. Two thin iron plates fixed to a wooden handle, in one of the iron plates is an opening to receive a wedge, by which it is fixed to the ſaw.

BRAKE. An inſtrument to confine blocks while boring the hole through the ſheave: it is formed of a piece of elm-plank, 3 inches thick, about 13 inches broad, and 3 feet long, in which, near one end, are two pegs, 2 inches and a half ſquare, fixed in mortiſe-holes. Two inches from the ſide edge, towards the other end, is a double row of holes: to one of theſe holes a brake is attached by a wooden pin, which brake is 2 inches thick, 20 inches long, and 4 inches broad at one end, and tapering to a handle at the other. It is uſed as a lever, by preſſing againſt it with the knee, and thereby confining the block.

BREAST

BREAST of a block. The oppoſite end to that which reeves the fall.

BURR. A triangular hollow chiſel, uſed to clear the corners of mortiſes.

CAP. A ſemi-circular projection from the ſides and round the end of a block above the pin, through it two holes are bored, obliquely from the ſides, which meet and form an angle at the end, through theſe holes the ſtrap is paſſed to prevent its being chafed

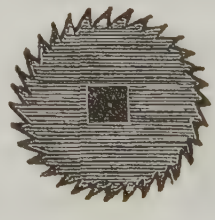
CHAMFERING Taking off, or flatting, ſharp edges.

CHEEKS of a block. The two ſides of the ſhell.

CHISELS. Sharp edged tools, made of iron and ſteel, of different lengths and breadths.

CHOCKS. Cylindrical pieces of wood or iron, ſcrew-cut at one end, to ſcrew into the end of a mandrel, at the other end, ſome have a ſort of peg to be driven into the work, which is retained by the aſſiſtance of an oppoſite centre: ſome chocks have, inſtead of a wooden peg, three pieces of iron in the end, this ſort is chiefly uſed for broad thin work, without an oppoſite centre. Iron chocks are ſcrew-cut, ſimilar to wooden ones, and have a box at the end, into which the work is driven and retained with or without an oppoſite centre; in the ſides of the box are holes to admit a punch to punch out the work.

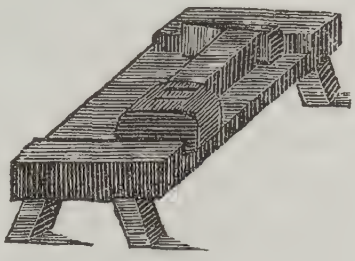
CIRCULAR SAW is uſed to cut ſheave-holes by the block-mill. The ſaw is fixed to the mandril, and the block to a ſliding puppet, by which it is conveyed to the ſaw in the direction of the ſheave-hole. The ſaw cuts it half way through in the middle: the block is



then

then reverſed, and cut as before to meet the former inciſion. Then, by boring a hole at each end of the ſheave-hole to its ſize, the wood is completely removed by ſawing a ſmall portion left by the circular ſaw.

CLAVE. A ſtool 14 inches high, made of elm, and ſupported by four legs, the top 6 feet long, 2 or 3 feet wide, 8 inches thick at each end, and only 4 inches thick in the middle, in which the ſhells are ſet up with wedges for making the ſheave-holes.



CLEATS FOR MASTHEADS, uſed for laſhing the jeer-blocks, are made of elm. The breadth is one-half the diameter of the maſt-head, the length once and a half the breadth, and the thickneſs half the breadth. The ſide next the maſt is ſtraight and fayed thereto, and the back or oppoſite ſide is hollowed two-thirds its length from the lower end, reſembling the bill of a duck. The upper end is rounded breadthways that the laſhing may have an eaſy bearing thereon; they are nailed to the maſt-heads with nails twice and a half their thickneſs.

CLENCH. To make a pin or bolt faſt by battering and ſpreading the point.

COAKING, OR BUSHING, is letting through the middle of a ſheave a cylindrical piece of metal with a hole through its centre, agreeably to the ſize of the pin that is to be admitted as an axis for the ſheave to run on, &c. &c.

COUNTERSUNK. A hollow, cut by a bit round the edge of a hole.

DRAWING-KNIFE. An inſtrument made of a piece of ſteel, 2 inches wide, and 20 inches long; the ends are drawn out fine, bent, and fixed in wooden handles; it is ground to a ſharp edge, and is ſometimes uſed, inſtead of the ſtock-ſhave, to pare off the rough wood.

FALL. The rope which, with the blocks, compoſes a tackle.

FORE-

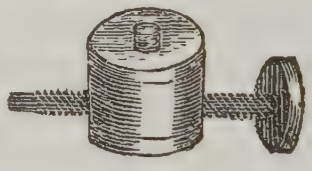
FORELOCK. A ſmall wedge of iron driven through a hole near the end of iron pins, to keep them from working out.

FRAME-SAW, for two perſons to ſaw with, has an iron bow over the back confined at the ends by rivets: ſome are ſet in motion by a mill, and have wooden frames.

FUTTOCK-PLATE is of iron; the upper part of it is open like a ring to fix the dead-eye in, and a round hole is punched in the lower end of the plate for the futtock-ſhrouds to hook in, or a bolt to be driven through when uſed for the lower ſhrouds.

GAUGE, a wooden inſtrument to mark off diſtances, is a ſquare ſtick 9 inches long, with an iron tooth through one end; this ſtick ſlides through a mortiſe in the middle of a ſemi-circular piece of wood that ſerves as a ſtop, the ſtick being moved at pleaſure.

GAUGE, of another ſort, uſed in the chopping of rough wood from the circumference of ſheaves. It conſiſts of a cylindrical piece of wood, about 6 inches diameter, hooped at each end: in the centre of one end is a pivot, about 1 inch diameter, and, through the centre of the cylinder, at right angles with the pivot, is a ſcrew-cut handle, having a flat circular piece fixed at one end. By the ſcrew-handle it is ſet to any diameter wanted, and, the pivot at bottom being placed in the hole of the ſheave, the flat piece at the end of the handle directs the axe to any nicety.



GOUGES are long, ſharp, circular-edged, tools, ſimilar to chiſels. Gouges and flat tools, uſed in turning, are ſtouter and longer than thoſe uſed with a mallet.

GREEN-HEART. A wood, imported from the Weſt Indies, uſed for the pins of blocks.

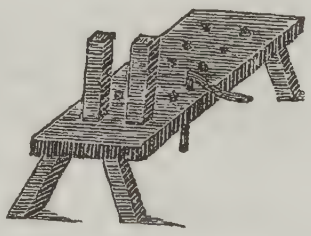
HAND-

HAND-SAW. Of this very common tool no particular deſcription is requiſite.

HEARTS FOR SEIZING, ſeized in the collars to extend the ſtays, are ſimilar to other hearts, but have the bottom cut off, near which, on the inner part, is a ſcore on each ſide, about half an inch deep and from four to ſix inches broad, to admit the ſeizing.

HOLDFASTS, to confine the work on the holdfaſt-bench, are made of iron from 15 to 30 inches long, and from half an inch to one inch and a half diameter: this iron is bent at one-third the length, and forms nearly a ſquare; the longeſt part is round, and is called the foot, the ſhorteſt part is flattened in the inſide, and is called the head: to confine the work, it is put through a hole in the bench.

HOLDFAST-BENCH. A bench of elm-plank, its top is 4 feet long, 12 inches wide, and 3 inches thick, with four legs 20 inches long: within 4 inches of one end are two upright pieces, 3 inches ſquare, fixed in mortiſes; and along the middle of the bench are two rows of holes, in which the holdfaſt is jambed to confine the work that is to be ſawed or trimmed.



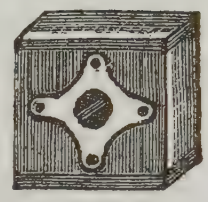
JAMBED. Set faſt with wedges.

LASHING. The rope laſhed to a block for ſecuring it to any object.

MANDREL of the turning-lathe. An iron ſpindle, with a ſcrew-cut box at one end, to ſcrew the chock in which confines the work, round the middle of the ſpindle is a collar with a groove, in which the cord works that turns it. It is uſed in a lathe that is worked by a wheel inſtead of a treddle.

MILL. A patent invention uſed by ſome block-makers; it conſiſts of a large horizontal wheel, turned by horſes, which, by means of other wheels, iron cranks, leather bands, &c. gives motion to different turning-lathes and frame-ſaws that cut the ſheaves and turn the ſheaves and pins. The plate of this mill more fully deſcribes its conſtruction and uſe.

MOOT.



MOOT. Uſed for turning block-pins by the block-mill. It is a piece of hard wood about 9 inches ſquare and 2 or 3 inches thick, hooped with iron at each end, and coaked with braſs in the centre, ſimilar to a ſheave. A mouth is made in the coak, and fitted with a ſharp ſtrong ſteel cutting-knife, reſembling a ſpoke-ſhave. The pin to be turned is fixed by its head in the mandrel, and the moot is advanced to it on the ſliding-puppet.

PREVENTER-PLATE. A broad plate of iron to ſupport the chains againſt the efforts of the maſts and ſhrouds, having a chain-bolt drove through its upper end and another through its lower end.

RASP. A ſort of rough file made of ſteel, with ſhort ſharp teeth. It is fixed in a wooden handle, and is uſed to rub down the edges of the ſhells of blocks, &c.

REAMING. Increaſing the ſize of a hole by a larger inſtrument.

RIB-SAW is a long narrow ſaw uſed in a pit.

ROLLER, a cylindrical pin turning on its own axis and is uſed in ſome blocks inſtead of a ſheave.

Patent rollers are made of two parallel circular plates of braſs, about a quarter of an inch thick. Four or more ſolid braſs cylinders are placed at equal diſtances round theſe plates, and work upon their own axis, between them, at right angles, in a braſs or caſt-iron box, neatly turned on the inſide, having angular ridges on the outſide, which fix it in the centre of the ſheave. The box is incloſed at each end with a plate of braſs, having a hole in its centre to admit the pin of the ſheave. Thus any pin working through theſe plates of braſs muſt touch the rolling ſurfaces of the ſolid braſs cylinders, by which the friction is conſiderably leſſened.

Circular plate of braſs, opening with a hinge.

A ſingle roller.

The two circular plates opening with a hinge, and the rollers between them.

Braſs or caſt-iron box

The plate of braſs to incloſe the box at each end

Section of a ſet of patent rollers when complete in their box.

Upon the patent rollers there has been an improvement. Of this latter invention, the rollers work, not on an axis ſupported at each end, but on a central axis, ſupported in the middle by, and working on, a ſingle plate of braſs, which has round its edge ſemi-circular cavities to receive the rollers: by which the invention is ſimplified and rendered leſs liable to diſorder.

A roller with a central axis

Plate of braſs to receive rollers with a central axis

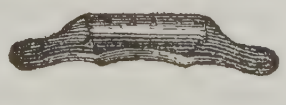
SADDLE is that part of a monkey-block which is hollowed out to fit the convexity of the yard, to which it is nailed.

SCORE. A notch or hollow cut by a ſaw, gouge, or chiſel.

SHACKLE. A ſemi-circular ring of iron, with a hole in each end for a ring or bolt of iron to paſs through, and is uſed to hook or laſh a tackle, &c. to.

SHOULDER. A projection made upon the ſurface of blocks, pins, &c. by reducing one part to a leſs ſubſtance.

SPOKE-SHAVE, a kind of plane to ſmooth and finiſh the ſhells, is a piece of ſteel, 4 or more inches long, and one inch and a half broad; ſharp at one edge as a knife, and a quarter

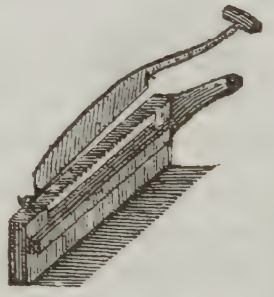


of

of an inch thick at the back: at each end is left about 2 inches of narrow ſteel, bent up as pegs, by which it is regulated and ſecured in a piece of wood 10 inches long, and narrowed at each end for handles.

STOCK. A wooden inſtrument to bore holes with, by fixing a bit in the lower end, and a pin with a round head in the other end; the pin and the bit ſerving as an axis to turn it on.

STOCK-SHAVE. A large ſharp-edged cutting-knife, with a handle at one end and a hook at the other, by which it hooks in an iron ſtaple that is driven in an elm-block; it is uſed to pare off the rough wood from the ſhells of blocks, &c.



STRAP. The circular binding of rope or iron ſurrounding a block, by which it is faſtened with a hook or laſhing to any place.

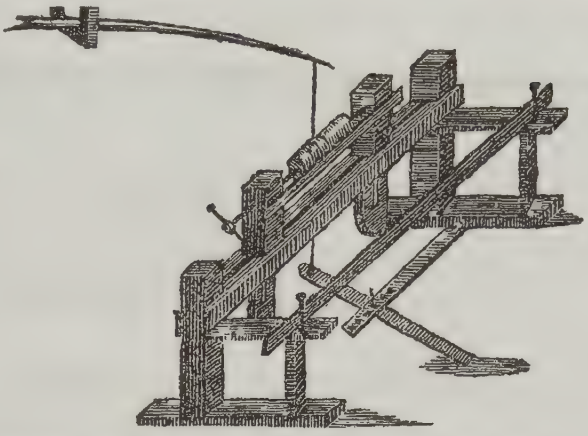
SWIVEL. Any thing which is fixed into another body in which it turns round.

SWIVEL-HOOK. A hook that turns in the end of an iron block-ſtrap, for the ready taking the turns out of a tackle.

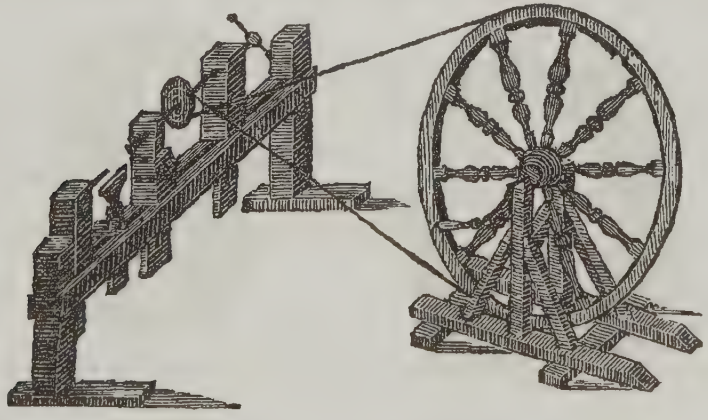
TOGGLE-BOLT A ſmall iron bolt, having a flat ſquare head, with a hole or eye punched through.

TREDDLE. Two thin battens 4 feet long, laid tranſverſely under the lathe. To the lower batten the cord is faſtened that connects it to the lathe, and the work is put in motion by the preſſure of the workman's foot: the upper batten is fixed at one end to the ground with a thick piece of leather, reſembling a hinge, and at the other end acroſs the under one by an iron pin, for which purpoſe 8 or 10 holes are bored along the middle to regulate it to the work.

TURNING-LATHE, a well known machine for turning ſheaves, pins, &c. is compoſed of two legs 34 inches high, and on each ſide their upper ends is faſtened a piece of oak, called



cheeks, about 8 feet long and 5 inches ſquare, and about 3 inches aſunder; between which ſlide two pieces of wood called puppets, that are made to faſten at any diſtance the work may require, by a wedge driven through them under the cheeks. Near the upper part of one is fixed a ſtrong ſharp ſpike of tempered ſteel, and oppoſite to it in the other is a ſharp-pointed iron ſcrew, between theſe, the work is ſuſtained and kept in a circular motion, by means of a cord turned round it, and faſtened above to a pliable pole, and underneath to a treddle moved by the foot; againſt the ſides of the puppets is confined a batten, with a pin through one end, called a reſt, for the workman to keep his tool in a ſteady poſition on. When the work is too heavy for the treddle to per-



form, a wheel is ſubſtituted, which is turned by one or two handles, and is connected by means of a cord, the ends of which are ſpliced together, and fixed in a groove round the wheel, then croſſed and put round a groove in the collar of the mandrel: to be turned with a ſwift and regular motion.

WEB. The thin partition on the inſide of the rim, and between the ſpokes, of an iron ſheave.

THE

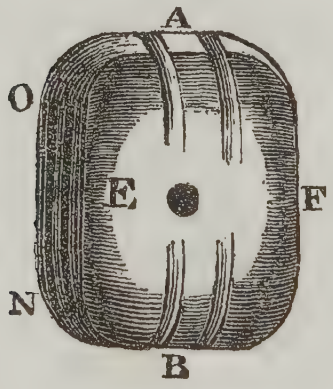
THE

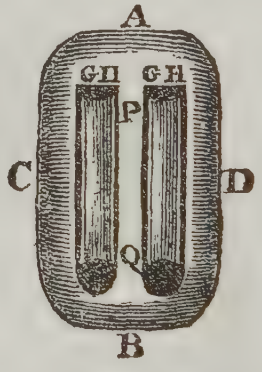
PRACTICE

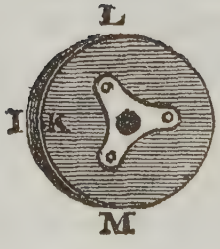
OF

BLOCK-MAKING.

THE following is the general rule for the dimenſions of blocks, ſheaves, and pins, as uſed in the Britiſh Navy.







The

The thickneſs of the ſheave (I K) $\frac{1}{10}$ more than the diameter of the rope.

The diameter of the ſheave (L M) = 5 times its thickneſs, or I K × 5.

The breadth of the ſheave-hole (G H) = $\frac{1}{8}$ of an inch more than the thickneſs of the ſheave, or I K + $\frac{1}{8}$ of an inch.

The length of the ſheave-hole (N O) = the diameter of the ſheave and breadth of the ſheave-hole added together, or L M + G H.

The thickneſs of the middle part or partition (P Q) = $\frac{5}{8}$ of the breadth of the ſheave-hole, or $\frac{5}{8}$ of G H.

The diameter of the pin (R S) = the thickneſs of the ſheave, or = I K.

The length of the pin (T U) = the thickneſs of the block, or = C D.

The length of the block (A B) = 8 times the breadth of the ſheave-hole, or G H × 8.

The thickneſs of the block (C D) = $3\frac{1}{2}$ times the breadth of the ſheave-hole, or G H × $3\frac{1}{2}$.

The breadth of the block (E F) = the length of the ſheave-hole, or = N O.

Flat thin blocks are three-eighths of the length thick; but all blocks, having more than one ſheave, increaſe their thickneſs more than the above proportion, by the additional number of ſheave-holes, and middle parts or partitions. Theſe are the general dimenſions, but ſometimes vary, according to the uſe intended for.

GENERAL DIRECTIONS FOR MAKING OF BLOCKS.

The ſhells of blocks are firſt ſawed to their length, breadth, and thickneſs, and the corners or angles are taken off. They

are

are then delivered to the workman, who firſt gauges the ſize of the ſheave-hole or ſheave-holes. In blocks of two ſheaves the middle part or partition is kept in the middle, each ſheave-hole being gauged equally on each ſide of it; and ſo for all blocks with a greater number of ſheaves.

The blocks are then jambed up edgeways with wedges in a clave, and the ſheave-holes are made thus · The length and breadth are firſt gouged out, and holes then bored half way through the block, along the part gouged out, with an augur the ſize of the ſheave-hole, the oppoſite ſide is then ſet up, and the ſheave-hole gouged and bored in the ſame manner, to meet the holes on the oppoſite ſide. Blocks from 10 inches and upwards have one hole bored at each end, and cut through with a chiſel, and the wood is ſawed out with a rib-ſaw. All blocks have the ſheave-holes cleared through by chiſels, and by burrs at the corners.

Blocks, which are to have iron ſtraps, ſhould have the ſtrap fitted on before the wood is cut out of the middle.

The hole for the pin is bored through the middle of the block, one-tenth leſs than the diameter of the pin. It is the practice of many block-makers to bore it after the ſheave-hole is cut, but it is better to bore it through the ſolid.

The outſides and edges of the ſhell are next rounded off by the ſtock-ſhave, and neatly finiſhed by the ſpoke-ſhave: as the neatneſs of the finiſhing depends upon the uſe the block is deſigned for, it reſts on the judgement of the workman. In the Royal Navy blocks are left thick upon the edges of the cheeks; but, for merchant-ſhips, the edges are ſometimes thinned off to a ſmall ſquare, and ſometimes rounded off.

The ſcores for the ſtraps are gouged out along the outſides of the cheeks, and taper in depth from nothing at the pin to half the thickneſs of the ſtrap at the ends of the block for a ſingle ſcore, and the ſame on each ſide of the pin for a double ſcore. The ſcores are gouged down, acroſs the breaſt of the block, to half the ſize of the ſtrap, to allow for the ſerving.

The ſcore round iron-bound blocks is taken out to the ſize of the iron ſtrap, ſufficient to bury it, except at the pin.

The

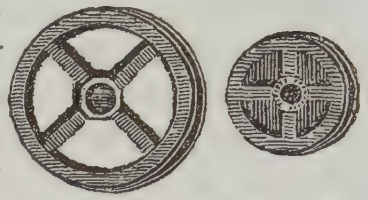
The ſheaves, after the ſcore is cut, are fitted. they are ſolid cylindrical wheels, commonly made of lignum vitæ; they are ſawed from the bough or trunk of lignum vitæ, which muſt be matched as near the ſize as poſſible; for, let the diameter of the piece be what it may, it will make but one ſheave, as the heart muſt be kept near the centre: the ſheaves are cut by hand with a frame-ſaw or by a mill, and often at the pit by a pit-ſaw. The hole for the pin ſhould be bored through the centre by a bit fixed in the mandrel of a turning-lathe, or with a ſtock and bit, and reamed with an augur one-ſixteenth larger than the diameter of the pin, that it may turn eaſily; they are then put in a lathe and turned ſmooth, and the outer circumference hollowed one-third of its thickneſs, that the rope may embrace it cloſely.

After the ſheaves are fitted, the inſide of the ſheave-hole, at the arſe of the block, is gouged hollow to admit the rope and anſwer with the ſheave, and a ſmall neat chamfer taken off the edges.

IRON STRAPS are from one quarter to one inch in thickneſs, and nearly three times the thickneſs in breadth: the thickneſs of iron ſtraps ſhould be proportioned to the ſtrain they are to reſiſt. The CAT-BLOCK muſt have a ſtrong ſtrap and large iron hook, which hooks the ring of the anchor in catting. The TOP-BLOCK, a ſtout iron binding with a ſtrong ſhort hook. TOP TACKLE-BLOCKS have ſtrong iron bindings, the upper block with a tackle-hook, and the lower block with a ſwivel-hook.

STRAPPING. A 17-inch block has a 5-inch ROPE-STRAP, and every inch in length, above or under, to a 12-inch block, has half an inch more or leſs ſized rope allowed for the ſtrap; an 11-inch block has a 3-inch ſtrap; a 10 and 9 inch block, 2 inches and a half; an 8 and 7 inch block, 2 inches; a 6-inch block, one inch and a half, a 5-inch block, 1 inch; and a 4-inch block, three-quarters of an inch.

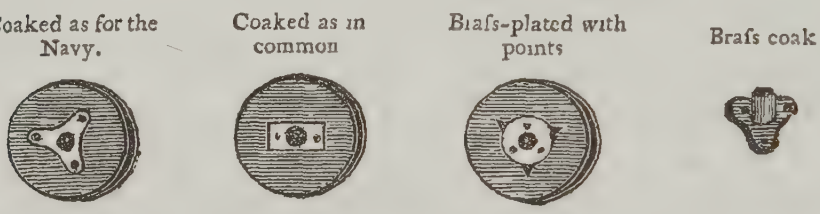
METAL



METAL SHEAVES. Sheaves for very laborious purpoſes are made of braſs or caſt-metal, either open or webbed, coaked in the middle with hard bell-metal, others are made of iron, with a braſs coak. Lignum-vitæ ſheaves are often coaked or plated to make them wear longer and work better.

COAKING, or BUSHING, is letting through the middle of a ſheave a cylindrical piece of metal, with a hole through its centre, to admit the pin or axis on which the ſheave turns.

LIGNUM-VITÆ SHEAVES.



On each ſide of the ſheave a plate is let in, having three or four correſponding holes in each, for rivets to go through, to ſecure and ſtrengthen the whole. The cylinder and one plate are caſt in one piece the entrance of the holes in the plates is enlarged, that the heads of the rivets and points, when clenched, may have a ſmooth ſurface. When but one plate, the rivets have broad heads, the holes in the ſheave are made accordingly, and the points are clenched on the plate.

Another mode of coaking, and preferable to the former, is to have each plate and part of the cylinder in which the pin works caſt in one; theſe are let into the oppoſite ſides of the ſheave, but do not meet in the middle by a quarter of an inch in ſmall ſheaves, and three-eighths in large ones: the cavity between them is filled with tallow, which diminiſhes the friction in working.

PLANK-COAKING is letting in narrow pieces of lignum vitæ, tranſverſely to each other, one on each ſide of the ſheave, which has likewiſe a ſmall circular braſs plate let in on each ſide, and rivetted through, as others.

PINS OF BLOCKS are made of lignum vitæ, or cocus; and ſometimes, for common blocks, of green-heart, a wood which is imported from the Weſt Indies: the pin is turned in a lathe, except the head, which is left eight-ſquare, to prevent its turning in the block, and is driven through the holes in the block and ſheaves. Braſs, iron, and lignum vitæ, ſheaves, that are coaked or plated, have non-turned pins with ſquare heads, and ſometimes a hole in the point for a forelock, to prevent their coming out.

MADE-BLOCKS have the ſhell made of ſeveral pieces of elm-plank, ſuited to the thickneſs of the cheeks, ſheave-holes, and middle parts, and are ſtrongly bolted together with three bolts at each end, driven through and clenched on a ring at the points.

Middle Ends. Cheeks.

Theſe blocks have flatter cheeks and ſquarer edges than other treble and fourfold blocks. Of this ſort are large, treble, and fourfold, blocks, for heaving down ſhips or other heavy purchaſes.

Smaller made blocks, of modern invention, are made of two pieces joining in the middle, and the pin to work on patent rollers let into the inſide of the cheeks, which are bolted or rivetted together at the ends. Theſe blocks are thought too complex for the Royal Navy, and not ſo eaſily remedied in caſe of failure.

BLOCKS OF PARTICULAR FORMS.

BEE-BLOCKS

are made of elm; in length, ſeven-ninths the length of the bee; the depth, two inches for every foot in length; and ſeven-eighths that depth is the thickneſs. It is trimmed ſquare, chamfered on the outſide edges, and fitted with

a ſheave in one end. a hole is cut in the other end to be fitted with a ſheave, ſhould the other fail.

The ſheave-hole is two-ſevenths of the length of the block, and one-fourth the length of the ſheave-hole in breadth, and half the length of the ſheave-hole within the end.

Bee-blocks are bolted to the outer ends of bowſprits under the bees, and the bolts ſerve as the axis or pin for the ſheaves to work on: the fore-topmaſt-ſtay reeves through the ſheave-hole at the foremoſt end of the ſtarboard bee-block, and the fore-topmaſt-preventer, or ſpring-ſtay, through the ſheave-hole at the after-end of the larboard bee-block.

CAVEL-HEAD-BLOCKS

are made of oak, 24 to 30 inches long, and 8 to 10 inches broad. A dove-tail ſhaped head is made on the upper end to belay to. They are thirded and bearded on the back, and the edges beaded. A ſheave-hole or two is cut through fore-and-aft: they are bolted to the ſhip's ſides, nearly oppoſite the maſts, to reeve the lifts, &c.

CHEEK-BLOCKS,

or half-blocks, are made of elm-plank, the length is twice and a half the depth of the topmaſt-head, the breadth is ſeven-eighths of the depth of the topmaſt-head, and the thickneſs half the depth of the topmaſt-head. The depth of each tenon and thickneſs of the cheek, when the ſheave-hole is cut, is each three-eighths of the whole thickneſs, conſequently the remaining two-eighths is the ſheave-hole. The three tenons to be each two inches ſquare, one in the middle, and one at each end, and the length of the holes to be the thickneſs of the ſheave more than the breadth of the block. The back of the block is divided into three parts, and one-third on each ſide is bearded down to one-third the thickneſs of the cheek on each edge. Pins of iron are made ſuitably to faſten them to the top-maſt-head, and the ſheave-holes are coppered, for durability. Cheek-blocks are bolted to the thwart-ſhip ſides of topmaſt-heads, cloſe up under

the cap the bolts ſerve as the pin or axis for the ſheaves to work on, the jib-ſtay and haliards, and fore-topmaſt-ſtayſail-ſtay and haliards, reeve through the cheek-blocks at the fore-topmaſt-head, and the main-topmaſt-ſtayſail and haliards, and middle-ſtayſail-ſtay and haliards, reeve through the cheek-blocks at the main-topmaſt-head.

DEEP-SEA-LINE-BLOCKS

are the ſame as a wooden ſnatch-block, only ſmaller, generally from 9 to 11 inches long.

D-BLOCKS

are lumps of oak in the ſhape of a D, from 18 to 24 inches long, and 8 or 10 inches wide. They are thirded and bearded on the back, and the edges beaded. A ſheave-hole is cut through the middle fore-and-aft. It is bolted to the ſhip's ſide, nearly oppoſite the maſts, to reeve the lifts, &c.

LONG-TACKLE-BLOCK.

The ſhell is made of aſh or elm, two-thirds longer than the proportion for a ſingle block, as it is ſimilar to two ſingle blocks joined together endways, one to be two-thirds leſs than the other. They are uſed for tackles, and are made agreeably to the ſize of the rope, as other ſingle blocks. They are uſed in the Royal Navy and Eaſt-India ſervice as yard-tackles; but, in the merchant-ſervice, as loading-tackles.

MAIN-SHEET-BLOCK.

The ſhell is made of aſh or elm, one-half longer than the proportion for ſingle or double blocks; the additional length is tapered, and a hole bored through between the ſheaves and the end, to admit the ſtrap: the length of the pin is the length of the block, and is ſimilar to a belaying-pin, as it is ſometimes uſed for that purpoſe. They are uſed for the ſheet-tackle of ſmall veſſels' mainſail-booms, are ſingle or double, and the ſheet or fall is always belayed round the pin.

MONKEY-

MONKEY-BLOCKS.

The ſhells are made of aſh or elm, ſome are only ſmall ſingle blocks, attached by a ſtrap and iron ſwivel to iron ſtraps that embrace and nail to the yard, the block turning to lead the ſmall running-ropes in any direction. Others are nearly eight-ſquare, with a roller working in the middle, the ſame as a ſheave, with a wooden ſaddle beneath, to fit and nail to the yard.

This ſort of blocks is ſometimes uſed on the lower yards of ſmall merchant-ſhips, to lead (into the maſt or down upon deck) the running-rigging belonging to the ſails.

NINE-PIN-BLOCKS.

The ſhells are made of aſh or elm, and reſemble the ſhape of a nine-pin, though flatted on the ſides their lengths are generally confined to the place they are fixed in, which is moſtly under the croſs-pieces of the fore-caſtle and quarter-deck bits. The breadth of the block, ſheave, &c. is governed by the rope as the ſingle block, and tapers at the ends to three-eighths of the breadth of the middle: the pin at each end, which ſerves as a verticle axis, is two-thirds the bigneſs of the end the thickneſs is five-eighths the breadth. Theſe blocks may be turned in a lathe, and flatted with a ſpoke-ſhave afterwards They are uſed to lead the running-ropes in a horizontal direction.

QUARTER-BLOCK.

See THICK-AND-THIN-BLOCK.

RACK-BLOCKS

are a range of ſmall ſingle blocks made from one ſolid, by the ſame proportions as ſingle blocks, with ends in form of a dove's tail for the laſhing, by which they are faſtened athwart the bowſprit to lead in the running-ropes. They are ſeldom uſed.

SHOE-BLOCKS

are two ſingle blocks cut in a ſolid piece tranſverſely to each other. They are uſed for legs and falls of the buntlines, but are ſeldom uſed.

SHOULDER-BLOCK

is a large ſingle block, left nearly ſquare at the lower end, or arſe, of the block, and cut ſloping in the direction of the ſheave. Shoulder-blocks are uſed on the lower yard-arms to lead in the topſail-ſheets, and, on the topſail-yards, to lead to the topgallant-ſheets, and, by means of the ſhoulder, are kept upright, and prevent the ſheets jambing between the block and the yard: they are alſo uſed at the outer end of the boomkins to lead in the fore-tacks.

SISTER-BLOCKS

are made of aſh, ſimilar to two ſingle blocks, and are turned out of a ſolid piece, about 20 inches long, one above the other between the blocks is a ſcore for a middle ſeizing: a round head is turned at each end, and hollowed underneath, to contain the end-ſeizings, along the ſides, through which the pins are driven, is a groove, large enough to receive part of the topmaſt-ſhroud, in which it is ſeized. In theſe blocks reeve the lifts and reef-tackle-pendents of the topſail-yards.

SNATCH-BLOCKS

are proportioned by the rope as a ſingle block, leaving twice the length for the ſcore and laſhing: they taper from the ſheave to the laſhing-end to half the breadth and thickneſs at the ſheave. one ſide of the ſhell is cut acroſs above the ſheave, large enough to admit the rope or fall. In the Royal Navy, ſnatch-blocks are iron-bound, terminating at the ſmall end with a ſwivel-hook, or an eye, large enough to receive ſeveral turns of laſhing: that part of the ſtrap, over the notch in the ſide, lifts

up

up with a hinge, and is confined down, when the rope is in the block, by a ſmall iron hook, or latch, that hooks in the eye of a toggle-bolt, and that ſecures the upper end of the ſtrap: the hinged part of the ſtrap goes over the bolt, with a hole in the end; the ſtrap is let into the block its thickneſs, and is confined by the pin and nails they are uſed for heavy purchaſes, and when a warp or hawſer is brought to the capſtern. Snatch-blocks, not iron-bound, have a large hole bored through the tapering end of the ſhell for the laſhing. They are uſed for the main and fore ſheet blocks of ſquare-rigged veſſels that have not fixed blocks let through the ſides.

STRAP-BOUND-BLOCKS

are ſingle blocks, with a ſhoulder or cap left on each ſide, at the upper part, to admit the ſtrap through, a little above the pin. Theſe blocks are uſed, at the clues of the ſquare-ſails, for the clue-garnets, or clue-lines, and under the yards. The ſhoulder ſaves the ſtrap from chafing.

THICK-AND-THIN, OR QUARTER, BLOCK

is a double block, with one ſheave thicker than the other, and is uſed to lead down the topſail-ſheets and clue-lines. In the merchant-ſervice they are ſeldom uſed

VOYOL, OR VIOL, BLOCK

is a large ſingle-ſheaved block, the length is ten times the thickneſs of the ſheave-hole, which is three-eighths more than the thickneſs of the ſheave: the thickneſs of the ſheave is one-tenth more than the diameter of the viol, and the diameter of the ſheave is ſeven times the thickneſs. The breadth of the block to be eight times the thickneſs of the ſheave, and the thickneſs to be two-ſeventhis of the length. This block is double-ſcored, the ſheave is coaked with braſs, and the pin is iron, and nearly the thickneſs of the ſheave. It is uſed in heaving up the anchor. The viol paſſes round the jear-capſtern and through the block, which is laſhed to the main-maſt, and the cable is faſtened in a temporary

temporary manner to the viol in ſeveral places. It is ſeldom uſed but in the largeſt ſhips in the Royal Navy.

WARPING-BLOCK

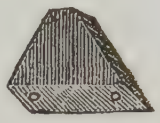
is made of aſh or elm board, ſhaped ſimilar to the body of a bellows: the ſides or cheeks are 8 inches and a half broad in the middle, and tapered to 2 inches broad at the ends, the back, or longeſt cheek, to be 16 inches long and ſeven-eighths of an inch thick, with a hole bored through the upper end to receive a leather ſtrap: the upper cheek is 12 inches long and ſeven-eighths of an inch thick, except the lower end, which is one inch and ſeven-eighths thick, and forms the ſheave-hole. The ſheave is one inch and a quarter thick and 7 inches and a half diameter, made of lignum vitæ, coaked with braſs: it is let into the cheeks one-eighth of an inch, to prevent the yarn getting between the ſheave and cheeks. The cheeks are faſtened together at the lower end with three ſcrews and nuts, and the pin, which is iron, is 7 inches long, driven through the middle of the block, with a ſhoulder on the upper ſide, and clenched at the point on the lower ſide of the ſhell. the upper part of the pin is tapered ſmall, and a wooden handle rivetted thereon. The cheeks have a broad chamfer round the outer edges, the inſide edges, and inſide of the block above the ſheave, are lined with thin iron, neatly ſcrewed on, to prevent the block wearing. This block is finiſhed in a neater manner than blocks in general, and is ſeldom uſed but by rope-makers to warp off the yarn into hauls for tarring.

BESIDES BLOCKS, THE FOLLOWING ARTICLES ARE GENERALLY FURNISHED BY BLOCK-MAKERS.

BELAYING-PINS are wooden pins turned in a lathe made of aſh, 16 inches long, one inch and three-eighths diameter at the upper end, which is turned as a handle; is three-ſevenths the length, then ſhouldered in to one inch and an eighth diameter. Some are made of IRON, tapering to each end.

BULLS

BULLS EYES are a ſort of ſmall oval blocks, without ſheaves, made of hard wood. They are turned in a lathe, have a groove round the outſide, and an oval hole gouged through the middle. They are uſed inſtead of blocks and iron thimbles, but very ſeldom uſed at all.



CHOCK. A ſquare tapering piece of elm; it is one-fourth longer than the ſize of the baſe, or but-end, with a hole bored through the ſides: uſed in ſtrapping large blocks.

CLEATS are made of oak-plank, or board, ſawed to the different ſhapes for the uſe deſigned, and then made ſmooth, and finiſhed with gouges, chiſels, and raſps. The largeſt are called

RANGES, or RANGE-CLEATS, for belaying tacks and ſheets to they are from 3 to 7 inches thick. and ſeven times the thickneſs in length. The arms are each one-third of the length, and made round; the middle, between the two arms, is left ſquare twice the thickneſs in breadth, through which it is bolted or faſtened; the back is curved in the length that the arms may riſe from the inſide ſtraight.

BELAYING-CLEATS are ſhaped the ſame as range-cleats, but are ſmaller.

SHROUD-CLEATS are ſimilar to belaying-cleats, with the addition of an inſide piece, out of the ſame ſolid, long enough to have a ſcore on each ſide of the middle part of the cleat to contain the ſeizings, which faſten it to the ſhroud, the inſide is hollowed to fit the ſhroud, and another ſcore cut acroſs the middle of the cleat for the middle ſeizing: the ſcores are rounded on the outſide edges, and cut deep enough to bury the ſeizing, to prevent its being worn when the rope is belayed.

SLING-CLEATS are made of elm-plank, in length once and a quarter the diameter of the yard, in breadth one-fourth the length, and thickneſs two-thirds the breadth. The ſhoulder to be one-third the length of the cleat, and hollowed on the back from the ſhoulder to the end: are uſed as ſtops to the ſtraps of jeer-blocks, &c. to the lower yards.

THUMB-CLEATS are ſimilar to arm-cleats in ſhape, but ſmaller, and are nailed up vertically to hang any thing on, or horizontally, as ſtop-cleats. STOP-CLEATS are made of oak-plank, or board, of all lengths under 12 inches: the largeſt are commonly for gammoning bowſprits and ſtops to ſtay-collars. The breadth to be one-fourth the length, the thickneſs to be two-thirds the breadth, and hollowed on the back. Thoſe for laſhings at the maſt-heads are made of elm, three times the thickneſs in breadth, and once and a half the breadth in length. COMB-CLEATS are made of aſh or elm-board, have one or more hollow cavities gouged in the middle, and the backs rounded, to reſemble a cock's comb. COMMON CLEATS are of elm, ſawed tapering on one ſide; are about 3 inches thick, 4 inches broad, and 12 inches long.

Alſo CLEATS FOR MASTHEADS, for which ſee the deſcription in page 142.

DEAD-EYES are blocks made of elm, without ſheaves, from 4 to 30 inches diameter, and are in thickneſs one inch more than half their diameter. Through the flatted ſides, one-fourth the diameter within the circumference, are bored three holes, which form a triangle large enough to reeve the lanyard. The ſingle hole is placed fartheſt from the reſiſtance, and the edges of the holes, neareſt the reſiſtance, are gouged or ſunk in to eaſe the ſtrain.

A ſcore is gouged round the middle of the outſide of the dead-eye, large enough to receive half the ſtay, ſhroud, or iron binding, which is connected to the links.

Dead-

Dead-eyes, for tops, are fixed in the futtock-plates, and uſed by ſome merchant-ſhips for the lower ſhrouds.

Dead-eyes are uſed when the ſtrain is too great to truſt a pin and ſheaves. Spare dead-eyes are iron-bound, with an eye, for the ready hooking, in time of neceſſity, to an iron eſs-hook.

FIDS are tapered pins made of wood or iron; the wood is turned in a lathe. SPLICING-FIDS are made of cocus, and are uſed for ſtrapping blocks and ſplicing the running-rigging. SETTING-FIDS, made of aſh, are uſed for ſetting blocks in the ſtraps. CABLE and STAY FIDS, made of elm, uſed in ſplicing ſtays and cables. Thoſe made of IRON are ſhort and thick, ſometimes having an eye in the largeſt end, and are commonly curved near the point.

HANKS are made of narrow hoops or tough wood, bent round and confined at the ends by notches. they are to haſten the deſcent of ſtayſails, being fixed on the ſtay, and the head of the ſail bent to the hanks. There are IRON

HANKS ſimilar in ſhape to the former, but open at the lower part, to go over the ſtay, made broader in the middle than at the ends, which cauſes them to ſpring to their ſhape; the ends are drawn out fine, and turned into a ſmall ring, for ſecuring the head of the ſail by the ſeizing. Iron hanks are moſtly to the foreſails of veſſels with one maſt.

HEARTS. A peculiar ſort of dead-eye made of elm, from 4 to 40 inches in diameter, ſhaped to reſemble a heart, and flatted on the ſides, through which are gouged a large hole to contain the lanıard that extends the ſtay: the larger the hole the better, ſo that one-third the diameter is left neareſt the ſtrain, decreaſing

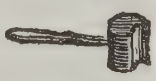
on the ſides and oppoſite part: four or more grooves are gouged at the edges of the hole on the broadeſt part, to receive the firſt turns of the laniard, and eaſe the ſtrain round the outer circumference is gouged a groove in the middle to receive the ſtay.

Alſo HEARTS FOR SEIZING. See the deſcription in page 144.

Sometimes hearts are uſed inſtead of dead-eyes for ſetting up ſhrouds.

IRON HOOKS, for tackles, are made with an eye to receive the thimble, and taper at the point: they are hollow on the back that a ſeizing may lie on them without ſlipping, or a catſpaw-hitch: a hole is generally punched through the point for mouſing. Iron hooks for the futtock-ſhrouds have a ſquare point, to prevent their unhooking.

MALLETS are cylindrical pieces of wood, with a wooden handle fixed in the centre, and are made of aſh or other hard wood, uſed for driving on the heads of chiſels or gouges. SERVING-MALLETS have a ſcore gouged out along the ſide for ſerving of ropes. DRIVING-MALLETS, or COMMANDERS, are about 20 inches long, and 8 or 10 inches diameter, with a handle three times the diameter in length. uſed for driving in large fids, and to beat up the fall round a capſtern.



MARLINE-SPIKE is made of iron, ſmaller than a fid, with a round knob at the head, and is uſed as the ſplicing-fid.

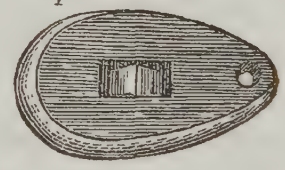
PARRALS. An aſſemblage of ribs and trucks, which, with the parral-rope, form a collar, to attach the upper yards to the maſts, ſo that the yard may ſlide eaſily up or down the maſt. The RIB is made of aſh-board, the diameter of the yard in length, and one-third the length in breadth.

breadth. It is ſtraight on the inner edge, and divided into two ſemi-circles on the back, with a hollow cavity between. Through the flat ſides are bored two holes, one in the middle of each ſemi-circle. The truck is made of aſh, or harder wood, the breadth of the rib in diameter, and one-third more than the diameter in length. it is turned in a lathe, and, through the centre, lengthways, is bored a hole, to anſwer thoſe in the rib. Some parrals conſiſt of trucks and a parral-rope only. They are globular, with a hole through the centre for the rope.

RACK. A narrow oak-board, or rail, containing a number of belaying-pins, which are uſed to belay ſmall running-rigging to. ſome belaying-pins are made of iron, and taper each way from the middle, and are driven into racks, boatſkids, or rails.

SERVING-BOARD is a tapering thin piece of board, with a ſmall ſcore gouged at the end and ſides. It is uſed for ſerving ſmall ropes

SHOES FOR ANCHORS are oval pieces of elm-plank, about 2 feet long, ſawed out, and rounded on the underſide with an adze. in the middle of the upper-ſide a double ſcore is taken out with a chiſel, 2 inches broad; ſunk three-fourths of an inch each way from the middle, that it may catch the bill in either direction at the ſmall end is bored a hole for a lanyard. It is placed under the bill of the anchor, when removed from one place to another, to prevent its tearing the ſhips ſides or deck.

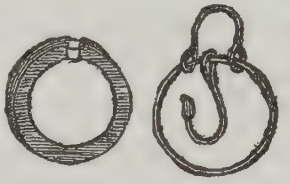


THIMBLES are circles of iron made by ſmiths, from 1 to 4 inches diameter, the edges are turned outwards, and form a groove to contain a rope on the circumference.

TOGGLES are turned in a lathe: thoſe for confining the ſtraps of large blocks, as the winding or the fiſh-tackle blocks, are large tapering aſh or oak pins, from 18 inches to 3 feet long, and one-fifth the length in diameter. Small toggles are little wooden pins, 3 to 9 inches long, and taper each way from the middle, round

which

which is a notch, whereby they are ſeized to the topmaſt croſs-trees, or elſewhere about the rigging.



TRAVELLERS are circles of iron, made by ſmiths, ſimilar to thimbles, but larger and much lighter: they are to facilitate the deſcent of topgallant-yards by the backſtays, &c. JIB-TRAVELLER is an iron ring, five-eighths to one inch and a half thick, and the diameter once and a quarter the diameter of the jib-boom, with a hook and ſhackle that ſlide on the ring.

TRUCKS. SHROUD-TRUCKS are ſhort cylindrical pieces of aſh, or harder wood, turned in a lathe and a little rounded on the edges, with a hole bored through the centre lengthways, and a groove gouged on the outſide in the ſame direction, to ſuit the ſhroud or rope intended to be ſeized to: round the middle, or at each end, is a ſcore, (turned,) for ſeveral turns of ſeizing to lie in. Some are only wooden balls with a hole through the middle, and grooved round the outſides for the ſeizing to lie in.

TRUCKS for the upper part of MASTHEADS or FLAG-STAFFS are made of elm, the ſize of the topmaſt in diameter, and one-ſixth the diameter in thickneſs: they are turned in a lathe, and reduced to three-fourths of the thickneſs at the edge; have a ſquare mortiſe cut through the middle to ſuit the head of maſts or ſtaffs, and a ſmall ſheave-hole cut through on each ſide of the mortiſe for the flag or other haliards. Thoſe which are uſed in the Royal Navy have ſmall braſs ſheaves and pins. In the merchant-ſervice they have only two holes bored through to reeve the haliards, which traverſe over a rounded piece of wood nailed acroſs the truck on the upper ſide.

Ornamental TRUCKS, for VANES, are turned in a lathe, moſtly ſhaped like acorns, with a hole bored up the centre, by which they are fixed, and terminate the end of the ſpindle, and prevent the vane-ſtock's riſing. Other trucks for this purpoſe are longer, and taper more to a point, according to fancy.

UPHROES

UPHROES are oblong blocks made of aſh, without ſheaves, from 9 to 30 inches long, and 2 to 5 inches diameter; having ſeveral holes bored through the middle at equal diſtances, and grooved round the outſide to receive the rope by which it is ſuſpended. They are uſed to ſuſpend the awnings, by extending the ſmall ropes equally through the holes lengthways along the middle of the awning: formerly uſed as a fence under the brim of tops, to prevent the foot of the topſail chafing, but are ſeldom uſed now for this purpoſe, except in ſmall veſſels.

WEDGES are made, by an axe or engine, of oak or beech, and are ſimilar to common cleats, but taper on both ſides.

A TABLE

A T

Of the CONT

BLOCKS for T

Made in the Year 1

SPECIES OF BLOCKS.	SIZE.	PRICE FOR EACH.			With lig	
					SIZE.	Sin
	In.	£.	s.	d.	In.	£
Treble careening, planked and plated, without ſheaves	38	8	8	0	6	0
	34	7	15	0	7	0
Double ditto	42	4	17	0	8	0
Iron bolts to ditto, 8 to a ſet, per ſet	—	0	15	0	9	0
Single planked and plated	32	2	10	0	10	0
Iron bolts to ditto, per ſet	—	0	7	6	11	0
Viol, planked and plated	44	2	11	0	12	0
	40	2	6	4	13	0
Single ſnatch, with biaſs-coaked ſheaves	32	2	19	9	14	0
	31	2	19	0	15	0
	30	2	18	0	16	0
	29	2	17	0	17	0

A B L E

RACT-PRICES OF

HE ROYAL NAVY,

1791, and ſtill unaltered.

BLOCKS, ;num-vitæ or caſt-iron Sheaves braſs-coaked, and turned iron Pins.				DEAD-EYES.		
gle of all Sorts.	Clue-garnet and Topſail. Sheet.	Clue-garnet and Topſail. Sheet&Tack.	Haliard, thin & long-tackle.	SIZE.	SHROUD, per Foot.	STAY, per Foot.
s. d.	s. d.	£. s. d.	£. s. d.	In.	s. d.	s. d.
1 4	—	—	—	3	0 7	—
1 11¼	2 1	0 2 1	—	4	0 8	1 0
2 3½	2 5½	0 2 5½	—	5	0 8	1 0
3 2	3 5	0 3 5	—	6	0 8	1 0
4 3	4 7¼	0 4 7¼	—	7	0 9	1 2
5 4	5 10½	0 5 10½	Haliard thin.	8	0 9	1 2
6 11½	7 6	0 7 6	0 6 7½	9	0 10	1 2
8 8	9 6¾	0 9 6¾	0 8 2	10	0 10	1 2
10 6½	11 4	0 11 4	0 9 6½	11	0 11	1 3
11 5	12 5½	0 12 5½	0 10 9½	12	0 11	1 4
13 6	14 4½	0 14 4½	0 13 6	13	1 0	1 4
15 8½	—	0 16 11½	0 14 2¾	14	1 2	1 6

Single for topmaſt-ſtays	20	1	4	10½	18
	18	0	18	6	19
	17	0	16	11½	20
	16	0	14	4½	21
	15	0	12	5½	22
	14	0	11	4	23
	12	0	7	6	24
	11	0	5	10½	25
Haliards thin and toptackle	11	0	5	0	26
	10	0	3	10	27
	9	0	3	0	28
Single braſs-coaked	5	0	1	0	29
Clue-garnet ditto	6	0	1	6	30
	5	0	1	6	31
	4	0	1	6	32
Ditto with wooden pins	6	0	0	10	33
	5	0	0	10	34
	4	0	0	8	35
Uphroes, 29 and 30 inches and upwards, per foot	—				36
	—	0	2	3	37
	—				38

All lignum-vitæ ſheaves braſs-coaked, and caſt-iron ſheaves braſ
pound.

All double blocks are charged at the price of two ſingle blocks; trei
blocks at the price of four ſi

☞ Ten per cent. is deducted from the above price

0	17	4½				0	18	6	0	14	10½
1	1	4½				1	2	5¼	0	18	7½
1	3	9¼				1	4	10½	1	0	3¼
1	7	0¾				1	10	4	1	4	8½
1	11	7				1	13	2¼	1	6	0
2	1	3				2	2	11	1	7	0
2	4	1½				2	5	6½	1	8	1¼
2	8	1				2	10	3	1	10	2
2	10	9¾							Longtackle.		
2	16	0							2	9	1¾
									2	16	0
									2	17	0
									2	18	0
									2	19	0
									2	19	9
									3	0	0
									3	1	0
									3	2	0
									3	3	0
									3	4	0
									3	5	0

15	1 3	1 6
16	1 4	1 8
17	2 0	1 8
18	2 0	2 0
19	—	2 0
20	—	2 0
21	—	2 6
22	—	2 6
23	—	2 6
24	—	2 6
25	—	2 8
26	—	2 8
27	—	2 8
28	—	2 10
29	—	2 10

s-coaked, with turned iron pins, one ſhilling per

ble blocks at the price of three ſingle; and fourfold ngle blocks.

TRUCKS, &c.

	s.	d.
Trucks, each	0	2½
Rib parrels	0	0¾
Trucks for ſhrouds and awnings . . .	0	2

	Inch.		
Trucks for topgallant-maſt heads	19	3	6
	18	3	0
	17	2	0
	7	0	8
	6	0	8

es in peace, and 6 per cent. added to the above prices during war.

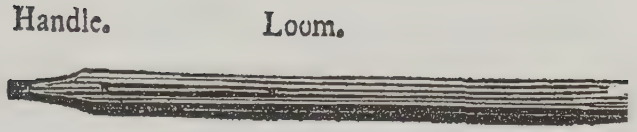
OAR-M

THE different parts of oars are deſcribed by the Ships' ſweeps and oars are made of hand-ma ſhould be choſen ſtraight-grained, free from large kno a ſnatch-block, and hewed nearly to their ſize; then ra or plane. Open handles are nailed to the ſides of the l one inch and three-quarters deep, and two inches and o and the loom: the length of the handle is one-third the

MAKING.

engraved figures, and their dimenſions by the tables.

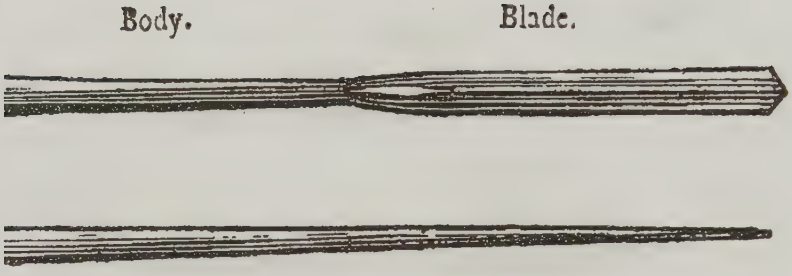
ſts, or rafters, ſuited to the ſize and length, as per table. They
ts, ſhakes, or rind-galls. They are firſt ſawed, or jambed in
iſed on horſes, and completed by the drawing-knife, ſpoke-ſhave,
oom in the direction of the flat of the blade, made of oak, about
ne-quarter thick, hollowed to admit the hand eaſy between that
length of the loom.



Handles.

DIMENSIONS OF SI

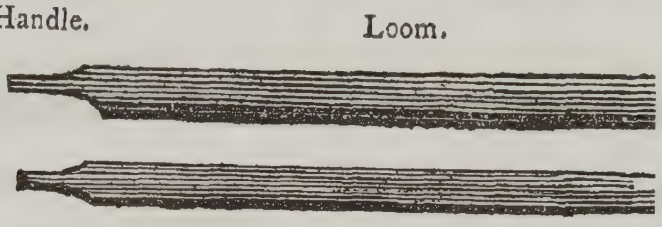
NUMBER OF GUNS.	LENGTHS.							
	Sweep.	Handle.		Loom.		Body, or Shank.	
	Feet.	Ft.	In.	Ft.	In.	Ft.	In.
100	52	2	2	19	6	13	0
98 to 90	50	2	2	18	9	12	6
80 to 74	48	2	2	18	0	12	0
64, 50, to 44 and 38	46	2	0	17	6	11	6
36 to 32	44	1	10	16	8	11	0
28 to 24	42	1	8	15	4	10	3
22, and sloops	40	1	8	14	2	9	6
40, 38, and 36, oars	36	1	8	13	4	9	0
32	34	1	7	12	6	8	6
28	32	1	6	11	9	8	0
24 and 20	30	1	6	11	0	7	6
Sloops and brigs	28	1	6	10	3	7	0



HIPS' SWEEPS AND OARS.

Blade.		LOOM.		BLADE.				Diameter of the Handle.	VALUE, 1797.		
				BROAD.		THICK.					
		Thick.	Deep.	Inner End.	Outer End.	Inner End.	Outer End.				
Ft.	In.	Inches.	Inches.	Inches.	Ft. In	Inches.	Inches.	Inches.	£.	s.	d.
17	3	$6\frac{3}{4}$	$6\frac{3}{4}$	$6\frac{1}{4}$	1 1	6	$1\frac{5}{8}$	$1\frac{3}{4}$	5	6	0
16	9	$6\frac{1}{2}$	$6\frac{1}{2}$	6	1 0	$5\frac{3}{4}$	$1\frac{5}{8}$	$1\frac{3}{4}$	5	2	0
16	0	$6\frac{1}{4}$	$6\frac{1}{4}$	$5\frac{3}{4}$	0 11$\frac{3}{4}$	$5\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{3}{4}$	4	12	0
15	3	6	6	$5\frac{1}{2}$	0 11$\frac{1}{2}$	5	$1\frac{1}{2}$	$1\frac{3}{4}$	3	12	0
14	6	$5\frac{3}{4}$	$5\frac{3}{4}$	5	0 11	$4\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	14	0
13	0	$5\frac{3}{8}$	$5\frac{3}{8}$	$4\frac{3}{4}$	0 10$\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	7	0
12	6	5	5	$4\frac{1}{2}$	0 10	$4\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{4}$	2	2	0
12	0	$4\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{3}{8}$	0 9	4	$1\frac{1}{4}$	$1\frac{3}{4}$	1	19	0
11	6	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{4}$	0 8$\frac{1}{2}$	$3\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{3}{4}$	1	16	0
11	0	$4\frac{1}{4}$	$4\frac{1}{4}$	$4\frac{1}{8}$	0 8	$3\frac{1}{2}$	$1\frac{1}{8}$	$1\frac{3}{4}$	1	13	0
10	6	$4\frac{1}{8}$	$4\frac{1}{8}$	4	0 7$\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{3}{4}$	1	10	0
10	0	4	4	4	0 7	$3\frac{1}{8}$	1	$1\frac{3}{8}$	1	7	0

Barges', lighters', and ſhips' boats', oars are made of fir-

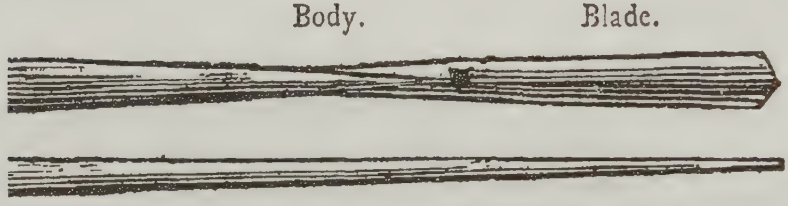


DIME

NUMBER OF TONS, &c.	LENGTHS.			
	Sweep.	Handle.	Loom.	Body, or Shank.
	Feet.	Ft. In	Ft. In.	Ft. In.
Tons 130	27	1 3	11 0	6 0
100	26	1 2	10 6	5 9
80	25	1 2	10 0	5 6
70	24	1 1	9 9	5 3
50	23	1 1	9 3	5 0
30	22	1 0	8 9	4 9
20	21	1 0	8 6	4 6
Boats 7 ft. 0 in in breadth, &c.	20	0 10	6 0	6 10
6 0	19	0 10	5 0	7 2
5 0	18	0 10	4 0	7 6
4 6	17	0 10	3 6	7 4
4 0	16	0 10	3 0	7 2

N. B. The looms of bo

rafters, ſimilar to ſhips', without handles to the ſides of the loom.

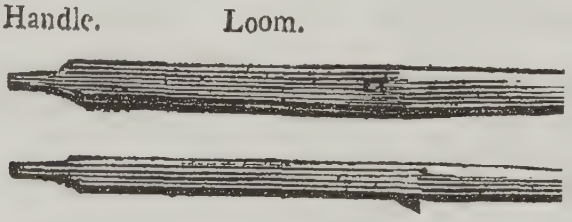


N S I O N S.

Blade.		LOOM.		BLADE				Diameter of the Handle.	VALUE, 1797.		
		Thick.	Deep.	BROAD.		THICK.					
				Inner End.	Outer End.	Inner End.	Outer End.				
Ft.	In.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches	£.	s.	d.
9	0	$4\frac{1}{4}$	$4\frac{1}{4}$	4	7	$3\frac{1}{8}$	1	$1\frac{3}{4}$	1	5	6
8	9	$4\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{3}{4}$	$6\frac{1}{2}$	$3\frac{1}{8}$	1	$1\frac{3}{4}$	1	4	0
8	6	$4\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$	$6\frac{1}{2}$	3	1	$1\frac{3}{4}$	1	3	0
8	0	$4\frac{1}{8}$	$4\frac{1}{8}$	$3\frac{1}{2}$	$6\frac{3}{8}$	3	1	$1\frac{3}{4}$	1	2	0
7	9	$4\frac{1}{8}$	$4\frac{1}{8}$	$3\frac{1}{2}$	$6\frac{3}{8}$	3	1	$1\frac{3}{4}$	1	1	0
7	6	$4\frac{1}{8}$	$4\frac{1}{8}$	$3\frac{1}{4}$	$6\frac{1}{4}$	3	$0\frac{7}{8}$	$1\frac{3}{4}$	1	0	0
7	0	4	4	$3\frac{1}{4}$	$6\frac{1}{4}$	$2\frac{7}{8}$	$0\frac{7}{8}$	$1\frac{3}{4}$	0	19	6
6	4	4	4	$3\frac{1}{8}$	$6\frac{1}{8}$	$2\frac{7}{8}$	$0\frac{7}{8}$	$1\frac{3}{4}$	0	19	0
6	0	$3\frac{7}{8}$	$3\frac{7}{8}$	3	6	$2\frac{3}{4}$	$0\frac{7}{8}$	$1\frac{3}{4}$	0	17	0
5	8	$3\frac{7}{8}$	$3\frac{7}{8}$	3	6	$2\frac{3}{4}$	$0\frac{7}{8}$	$1\frac{3}{4}$	0	15	0
5	4	$3\frac{3}{4}$	$3\frac{3}{4}$	$2\frac{7}{8}$	$5\frac{3}{4}$	$2\frac{5}{8}$	$0\frac{7}{8}$	$1\frac{1}{2}$	0	14	0
5	0	$3\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{3}{4}$	$5\frac{3}{4}$	$2\frac{1}{2}$	$0\frac{3}{4}$	$1\frac{1}{2}$	0	13	0

ats' oars are often made round.

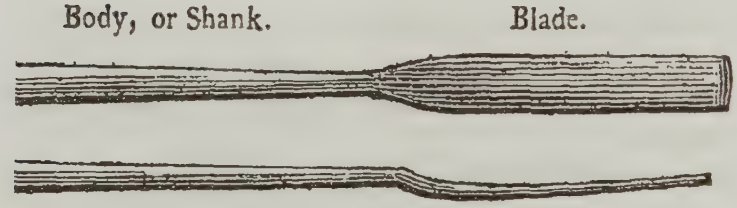
Oars and ſculls for barges, wherries, and ſkiffs, are
ſen tough, ſtraight-grained, without ſhakes or large kn
a neat manner on horſes by drawing-knives, ſpoke-ſhav
two inches from the loom, and that edge rounded, to
round with tin to prevent its ſplitting.



DIM

BREADTH OF THE BARGE, WHERRY, OR SKIFF.	LENGTHS.			
	Oar.	Handle.	Loom.	Body, c Shank
Ft. In.	Feet.	Inches.	Ft. In.	Ft In
5 9	20	11	4 6	8 11
5 6	19	11	4 4	8 5
5 0	18	10	4 0	8 0
4 9	17	10	3 10	7 7
4 6	16	10	3 6	7 4
4 3	15	10	3 3	7 0

made of aſh (and ſometimes of fir) rafters, which ſhould be choots. The rough wood is taken off with an axe, and finiſhed in es, and planes. A leather button is nailed on the foreſide, about work eaſily in the rowlock: the lower end of the blade is ſtrapped



ENSIONS.

Blade.		LOOM.		BLADE.				Diameter of the Handle.	VALUE, 1797, per Pair.		
		Thick.	Deep.	BROAD.		THICK.					
				Inner End.	Outer End.	Inner End.	Outer End.				
Ft.	In.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	£.	s.	d.
5	8	4	$4\frac{1}{2}$	$2\frac{1}{4}$	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{3}{4}$	$1\frac{5}{8}$	1	8	0
5	4	$3\frac{3}{4}$	$4\frac{1}{4}$	$2\frac{1}{4}$	$6\frac{1}{4}$	3	$\frac{3}{4}$	$1\frac{5}{8}$	1	6	0
5	0	$3\frac{1}{2}$	4	2	6	$2\frac{3}{4}$	$\frac{3}{4}$	$1\frac{5}{8}$	1	4	0
4	8	$3\frac{1}{4}$	$3\frac{3}{4}$	$1\frac{3}{4}$	$5\frac{7}{8}$	$2\frac{1}{2}$	$\frac{5}{8}$	$1\frac{5}{8}$	1	1	0
4	4	3	$3\frac{1}{2}$	$1\frac{1}{2}$	$5\frac{3}{4}$	$2\frac{3}{8}$	$\frac{1}{2}$	$1\frac{5}{8}$	0	18	0
4	0	$2\frac{3}{4}$	$3\frac{1}{4}$	$1\frac{3}{8}$	$5\frac{1}{2}$	$2\frac{1}{4}$	$\frac{1}{2}$	$1\frac{5}{8}$	0	16	0

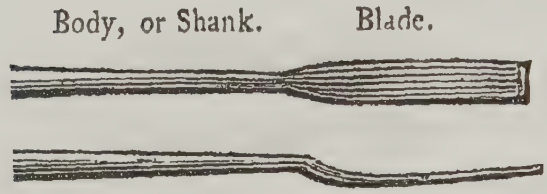
Sculls for wherries, ſkiffs, &c. for

DIME

BREADTH OF THE BARGE, WHERRY, OR SKIFF.	LENGTHS.			
	Oar.	Handle.	Loom.	Body, or Shank.
Ft. In.	Feet.	Inches.	Ft. In.	Ft. In.
5 6	14	$4\frac{1}{2}$	2 4	7 9
5 3	13	$4\frac{1}{2}$	2 2	7 2
4 9	12	4	2 0	6 8
4 6	11	4	1 11	6 0
4 3	10	4	1 9	5 5
4 0	9	$3\frac{1}{2}$	1 7	4 10

N. B. Oars or ſculls made of fir exceed the dimenſion
oars is ſeven ſhillings leſs than aſh oars, and fi

choice and make are ſimilar to wherries' oars.



NSIONS.

Blade.		LOOM.		BLADE.				Diameter of the Handle.	VALUE, 1797, per Pair.		
		Thick.	Deep.	BROAD.		THICK.					
				Inner End	Outer End.	Inner End.	Outer End.				
Ft.	In.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches	£.	s.	d.
3	6	3	$3\frac{1}{2}$	2	$5\frac{1}{2}$	$2\frac{1}{4}$	$\frac{1}{2}$	$1\frac{3}{4}$	0	14	0
3	3	$2\frac{3}{4}$	$3\frac{1}{4}$	$1\frac{7}{8}$	$5\frac{3}{8}$	$2\frac{1}{4}$	$\frac{1}{2}$	$1\frac{3}{4}$	0	12	0
3	0	$2\frac{1}{2}$	3	$1\frac{3}{4}$	$5\frac{1}{4}$	$2\frac{1}{8}$	$\frac{1}{2}$	$1\frac{3}{4}$	0	10	6
2	9	$2\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{5}{8}$	$5\frac{1}{8}$	$2\frac{1}{8}$	$\frac{1}{2}$	$1\frac{3}{4}$	0	10	6
2	6	$2\frac{1}{8}$	$2\frac{5}{8}$	$1\frac{1}{2}$	5	2	$\frac{1}{2}$	$1\frac{3}{4}$	0	9	6
2	3	2	$2\frac{1}{2}$	$1\frac{3}{8}$	$4\frac{3}{4}$	2	$\frac{3}{8}$	$1\frac{3}{4}$	0	8	0

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